

SECOND ANNUAL REPORT  
STATE DAIRY COMMISSIONER  
MISSOURI

1906



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Compliments of

*R. M. Washburn.*

Commissioner.





# SECOND ANNUAL REPORT

OF THE

# STATE DAIRY COMMISSIONER

TO THE

Governor of the State  
of Missouri

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*R. M. WASHBURN.*  
*State Dairy Commissioner*

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Printed by Order of the General Assembly.



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## MISSOURI DAIRY COMMISSION.

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R. M. WASHBURN.....Commissioner  
D. J. CLIFFORD.....Deputy Commissioner  
CHEMIST, EXPERIMENT STATION.....Chemist

## LETTER OF TRANSMITTAL.

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To His Excellency, Joseph W. Folk, Governor of Missouri:

Sir—In compliance with the law, I have the honor to submit herewith the second annual report of the State Dairy Commissioner.

Very respectfully,

R. M. WASHBURN,  
State Dairy Commissioner.

Columbia, Missouri, January 1, 1907.

## FINANCIAL REPORT.

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(From January 1, 1906, to January 1, 1907.)

Salary of Commissioner.....	\$1,999 80	
Salary of Deputy Commissioner.....	877 40	
	<hr/>	\$2,877 20
Traveling expenses of Commissioner.....	\$864 27	
Traveling expenses of Deputy Commissioner	649 87	
	<hr/>	1,514 14
Printing letter heads, envelopes, blanks, re- ports, etc., .....	\$898 47	
Office furniture . . . . .	245 09	
	<hr/>	1,143 56
Total . . . . .		<hr/> \$5,534 90





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## PART I.

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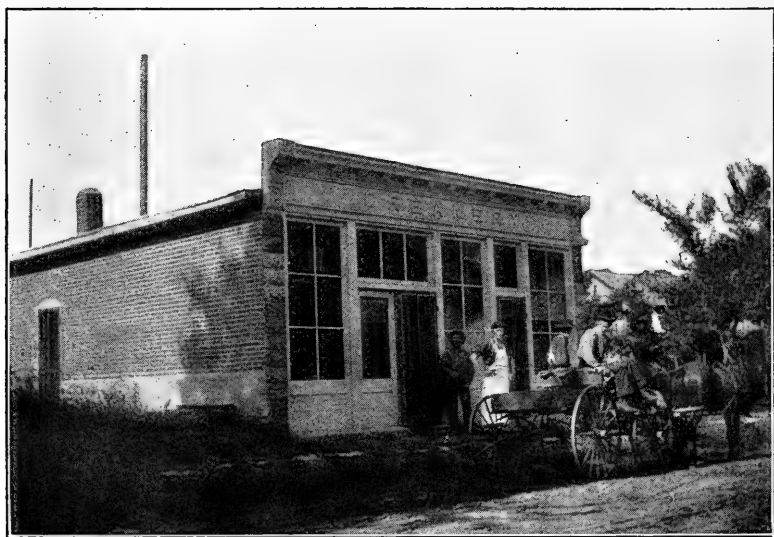


Fig. 1. Creamery at Neosho, Mo.

## THE NECESSITY FOR STATE SUPERVISION OF THE DAIRY INDUSTRY.

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*Function of Government*—Any government, whether it be local, state or national, should hold as one of its fundamental functions the betterment of the material condition of her people with just as much zeal as it would defend them in time of war. Just as a father counsels his sons to prepare themselves in a profitable and lasting industry, so should a government encourage its people in those pursuits which, from a close study of world conditions, prove themselves to be fundamentals in the country's prosperity. A government which neglects to give her people such support and guidance deserves not the patriotism of those people nor their taxes.

*Future Wealth of the State*—The future wealth of this country and this State now lies dormant in the soil. Any industry, no matter how profitable temporarily, if it is destined to reduce the fertility of our lands to a point of poverty, should not be generally encouraged. The raising of wheat and corn and flax and other grains should be pursued carefully, for they rob the soil of that which makes human existence possible. Of all the many avocations of man, the dairy industry is the most productive of present and future prosperity. *One acre of grass pastured by a good dairy cow will produce from five to ten times the amount of food for the human family that that same acre would had it been pastured by a good beef animal.* The economical production of human food, though ultimately the point to be considered, is not now the only feature to be taken into account. Under the present market conditions, which conditions, so far as our present knowledge goes, are permanent, there is from four to six times the amount of profit to be derived from the dairy cow.

*Economy of the Cow*—The dairy cow is a wonderfully constituted creature, capable of working day and night, capable of consuming large quantities of rough and cheap foods, and work-

ing them over into the most delicious and useful of human foods. Not only is she capable of yielding more than her own weight yearly in milk solids, all of which are marketable as human food, but while doing this, she, at the same time, works over the coarse vegetation of the farm into a very useful form for the land. The amount of milk, butter or cream sold more than pays the cost of the raw material. Yet of the 16 cents worth of soil fertility contained in a bushel of corn, she returns to the soil about 14 cents worth. Of the 26 cents worth of soil fertility contained in a bushel of wheat, she returns about 23 cents worth. Nature has been beautifully economical. This cycle of uses always reminds me of a steam heating plant. The water in the boiler is heated and circulates through the radiators in the form of steam. The heat is given off and the water itself returns to the boiler to be re-heated and again performs its work as a warmer. So the original ingredients in the soil grow into a plant, are consumed by the cow and returned to the soil, where again the same identical matter which helped to build one corn plant may aid another, and yet another, an indefinite number of times.

*What the Man Must Know*—The requirements for successfully carrying out this plan of Nature are greater than those required to successfully raise grain or beef. *The successful dairy farmer must know accurately a greater variety of subjects than any other class of men.* The composition and requirements of the soil, the habits of growth and composition of the several crops and their several effects on the land, the compounding of these crops into an economical ration, the feeding according to the needs of the animal, the handling of the herd according to the needs of the several individuals, the handling of the by-product back to the fields in a way that the minimum shall be lost, the handling of the delicate food, milk, in such a way that it shall lose none of its original properties, and the marketing of it where he shall secure the highest available market price; all these the dairy farmer must know. Any one of these branches might easily be broadened to furnish a life-work for a man. Little wonder then that so few of our people have met success in high degree.

*State Should Aid*—The government, especially here in this country, where the people are trying to be the government, should set aside money and create a department for carrying these many truths in their varied forms to her people. Right here, allow me to mention fragments of my own experience in this very work. Two years ago, near the western border of Missouri, there was a

cheese factory. It had been running several years, yet was doing poorly. Located far from the railroad, these farmers found it necessary to maintain a factory that they might have a market. This market, however, was paying the farmers only about 45 cents a hundred pounds for their milk. This was less than the market price of the food consumed by the cows to make that milk. The cheese they produced was so poor at certain seasons of the year that many pounds of it were burned, it being more valuable as fuel than as food. A letter was received at the Agricultural College asking for help. I was sent to investigate. Being a practical cow man and cheese-maker, I soon learned the difficulty. A meeting of the farmers was held, the situation was thoroughly explained. Today that cheese factory is having trouble, but of another kind. Their cheese is selling above market price, yet they are unable to supply the demand. Their milk is now netting them over \$1.00 a hundred. Last summer I was inspecting a little cheese factory in the northwest part of Missouri, and found that the method employed by the maker was such that he was losing 10 per cent. of his gross receipts and did not know it. It required less than twenty minutes to show and explain to this man how to save the remaining 10 per cent. In another factory I found the manager discouraged and nearly ready to close down. His yield was poor and the quality not high. Investigations showed that his patrons were skimming and watering their milk to such an extent that they were all but killing the enterprise. Here is where the police power of the instructor comes well in play. A pointed personal letter, typewritten, on paper bearing the letter head of the State Dairy Commission, was all that was required to make most of these people get good. In one co-operative factory I found the same thing going on, and even found the president of that co-operative company guilty of skimming. It is not sufficient that the traveling instructor be able to guide the cheese-maker or the butter-maker; he must also have authority to compel arrest and fine, otherwise these evil-doers will only laugh and continue. In the eastern portion of Missouri a butter factory was having many troubles. It seemed impossible to produce butter of the highest grade. Many of the patrons had become careless in the matter of washing their milk cans. So many of the neighborhood had drifted into such fearfully dirty habits that the quality of the entire product was lowered very materially. The operator could remonstrate, and would have done so had he been willing to make enemies in the neighborhood. An outsider is necessary, and not

only an outsider, but one clothed with the authority of the law. I told a farmer that he must direct those who washed his cans to be more careful; to use a brush on the inside. He turned to me and said, "Oh! You bin a brush agent, hugh?" I laughed, and showed him my star. He promised to get and use a brush. In a little factory in the Ozarks I found little to complain of in the factory, and nothing in regard to the farmers, yet an opportunity to do good presented itself. A farmer, who was just struggling into the business, informed me that he intended buying a certain Jersey bull, and not being an expert himself, he asked me to go with him into the country to see the animal. The creature had been highly spoken of by its owner, yet upon investigation I found the thing to be at least one-half not Jersey, and a very inferior animal for any breed. Had this man purchased this animal, as he intended doing, he would have lost six or eight years of hard work. Where the trouble is found to be caused by ignorance, the instructor is necessary, but where the trouble is caused from indolence or something worse, there the inspector, with police power, is absolutely essential to improvement. These few cases indicate the nature of the work to be done. Continue it the year round, in private conversation, in public meetings, in correspondence and in public writing, and the money value to the State cannot be measured.

Having spent twenty-five years on a dairy stock farm, having made hundreds of tons of butter, and cheese by the car load, and having had five years of experience in public work, I am in a position, I think, to see what is needed.

*In Missouri*—Over in Missouri I find that about 25 per cent. of the entire number of *cows are kept at a loss*, that more actual money would be made if the poorest one-fourth of the cattle were disposed of. I have no doubt that the same is true out here. A work which I am going to start just as soon as I can get the means is to go over the State in a great many communities and test the yield of the cows for a year. The results will be published locally, so all may become convinced of the value of closer selection.

An increase of only one per cent. in net profits will be worth \$200,000.00 a year to the farmers of Missouri. It will be worth nearly as much in Kansas. To increase the net earning 10 per cent., which is easily possible, would be worth two million dollars a year in Missouri. Our entire dairy force of instruction now costs the State only about \$8,000.00 a year.

*Summary*—Considering the great value of this industry to this



great State, and considering the many intricate problems which must be solved by or for the dairy farmers, I sincerely hope that your State will soon establish a Dairy Commission, that a practical and honest man may be placed in charge of it, and that sufficient funds may be turned over to his use that he may truly advance the knowledge of your farmers in this fundamental industry.

(Address delivered by R. M. Washburn, January 3, 1907, before the Kansas Dairy Association, at Manhattan, Kansas.)

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## THE INSPECTION OF CREAMERIES.

The first thorough official inspection of the creameries of Missouri occurred during the summer of 1906. The inspection was made by the Dairy Commissioner of this State. For a good many years the butter-makers of this State, both in large factories and in small, have been struggling by themselves to improve the quality of their product. To do this, it was necessary to labor along two separate lines. It was up to the butter-maker to compel, in some manner, the producer of the raw material, to deliver his goods in better condition, and when received, it was again up to the butter-maker to know how to work up this very dissimilar mess into a uniform and high grade article. By close attention to business, and by the reading of up-to-date trade journals, most of the young men were able to accomplish the second task as well as could be expected with their limited means and very limited time for travel among other factories. To accomplish the first task, that of improving the quality of the raw material received, is far more difficult, and many of the boys fell down on this essential. One great fault found with the creamery butter made in Missouri has been its lack of uniformity. How could this be otherwise with so many independent workers and with very little unifying influence? A State Instructing Inspector has been needed for years. The inspector, without ability to instruct those whom he criticises, would create only contempt; the instructor without police power would be impotent in the changing of present poor conditions. The following is a criticism of the several factories:

*Factory No. 1*—This establishment was not built, it grew, and from a very small beginning. The proprietor started out in the hide and chicken business on a small scale, gradually buying in country butter, and later, cream, first shipping everything, then

later putting in a little churning plant and disposing of the butter himself. The institution has grown to be of good proportions, where each line of work is housed in a separate building built for the purpose. Everything was neat and business-like about the place. The great difficulty at this point was the almost impossibility of securing the cream in a first-class condition. Steps were taken to help the local manager make the patrons realize the value it would be to them to deliver a better article. The butter-maker was clean shaven and wore clean clothes.

*Factory No. 2*—This is an individual creamery, located in a fairly good-sized town. It also was run on the semi-centralizing plan, cream being shipped in from all over the county, and naturally received in rather poor condition. The factory conditions at this point were anything but good. The building was old and had never, apparently, been kept clean. The floors of the receiving room, store room and the office, were positively filthy. Smoking and spitting at the stove seemed to have been indulged in freely and for a long time, with a very feeble effort toward cleaning. As would naturally be expected, the butter-maker of this plant was in such an untidy condition that he advertised his butter to very poor advantage, indeed. This man scorned creamery papers, which most butter-makers find so useful to them. At this plant instruction was sought of the inspector regarding the efficiency of the several pasteurizers on the market and the economy of the instrument for a plant doing that amount of business.

*Factory No. 3*—This is a little co-operative plant located in a conservative German community. The factory had been run for years, and had always paid the farmers well, and one of the chief reasons for the success is that the business manager, an intelligent farmer, living near town, had been retained as business manager until he had learned how a factory should be managed. This had been a whole milk creamery for many years, but the farmers have, one by one, purchased hand separators, and now deliver only the cream at the factory. The quality of the butter had been maintained by a rigidly enforced rule compelling the patrons to deliver their cream in a sweet condition. This plant is presided over by a tidy and thrifty young man, who is eager to learn from every possible source how to improve his product or his factory. At this factory advice was needed on how to save labor. The young man was killing himself working against difficulties, which should not have existed.

*Factory No. 4*—This is a large centralized factory in a large

city. The factory was an improvised one, and though not really convenient, was answering the purpose, and was being kept in reasonably good condition. Very little assistance was needed at this plant in the matter of technique of butter-making. The great drawback here was the difficulty in obtaining a sufficient quantity of cream in a reasonably good condition. Later the Commissioner spent two weeks in the territory of this company, lecturing to farmers on the profitableness of cream production, and how to succeed in it.

*Factory No. 5*—This is an individual plant in a small town, where there is a very limited local demand for creamery butter, and where there is a pretty good demand for pasteurized sweet cream and milk. The factory was equipped with modern machinery for butter-making and with good pasteurizer and cooler for use in pasteurizing such quantities of sweet milk and cream as could be obtained. The manager was experiencing difficulty, and wondered the reason. He claimed that the pasteurized milk kept but very little better than the raw. By watching the men in the factory work for a time, the reason was discovered. Not one man of the entire force really understood what he was doing. They were going through the motions of pasteurizing in good shape, but neglected to sterilize their bottles, and had very meagre means for thoroughly washing them. It was necessary here to explain thoroughly the nature of bacteria, and the meaning of the word dirt, and the absolute necessity of having a sterilizer to kill the bacteria in the bottles in order that reinoculation of the milk should not take place. The operators were reasonably tidy and were earnest workers, but only half understood the work they were doing.

*Factory No. 6*—This is a small stock company, which was formed in a small town to try to make something out of the shell that remained when a promoted co-operative creamery bubble burst. A fair amount of business was being secured locally. The factory was clean in the extreme, as was also the boy who had it in charge. The young fellow realized that this, his first creamery position, would determine, in a measure, his rating among State teachers and inspectors and others who occasionally had positions to find men for. A few suggestions regarding convenient arrangement for saving labor, and a lecture to the farmers on how to produce more economically, were the helps needed and received at this plant.

*Factory No. 7*—This factory had been located in a section of

the country which needed the good influences of the creamery very much, but appreciated them very little. It was nip and tuck to get enough raw material upon which to make the enterprise succeed. The manager was well-informed and energetic, and the factory well equipped. A letter to each of the leading farmers of that community, calling attention to the greater profit to be obtained from their present cattle if cream were sold, and an article in the local paper on a similar subject, was all that could be done at that time.

*Factory No. 8*—This is a thrifty little co-operative plant, loyally supported by the farmers of the vicinity, and conducted in a business-like manner by the butter-maker, who is more than a mere maker of butter. This factory was just undergoing the transition from a whole milk to a hand separator cream factory. The farmers were becoming a little careless, but a little touching up of a few of the more prominent offenders and a cheering up of the manager resulted in some good, and the business is improving.

*Factory No. 9*—This is an individual creamery which was built to take the place of a co-operative factory which burned down and was not rebuilt. The chief difficulty in this place was that the proprietor and manager did not understand business and could not read English well enough to receive ideas from another man through the medium of the papers. The farmers of that neighborhood had several years ago been loyal supporters of the creamery, largely, they said, because they needed to keep cattle in order to maintain the producing capacity of their farms, but upon the introduction of commercial fertilizers most of them had sold their stock and were relying upon commercial fertilizers to maintain the fertility for their soils. That they are making a serious mistake, and that they will be forced to again keep stock, time only can show them. If the present manager of the creamery can, by going after the cream, continue to live until the farmers come to their senses, success is assured. Some time was spent at this place instructing the manager how to hang on.

*Factory No. 10*—This is a prosperous co-operative company, located in a community of thrifty Germans. Like many another that had run for years on the whole milk system, this factory was gradually being converted into a hand separator cream factory. The Board of Directors gave the manager authority to make the rule that none but sweet cream should be accepted. With the manager and directors to back him, the butter-maker was able to enforce the rule. It is to be hoped that it will always be enforced,





Fig. 2. Farmers' Co-operative Creamery at Concordia, Mo.

for in that way only can the high quality of their butter be maintained. A few farmers in this neighborhood had become careless in the matter of washing their cans. The inspector, on examining the cans as they were being received one morning, found one which demanded some attention and whose owner was present. The inspector informed the farmer that he should use a brush and clean the insire of his can better, to which the farmer replied, "Oh, you bin a brush agent, hugh." Upon seeing the star of the inspector the man apologized and promised to get and use a brush. This incident merely emphasizes the point made previously that the instructor, without police power, will be of very little service where carelessness has become the habit. The factory, being a new one and presided over by an intelligent and industrious young man, was above criticism.

*Factory No. 11*—This factory, though little old and many miles off the railroad, was one of the cleanest in the State. Even the walls and ceiling had been thoroughly scrubbed. The machinery, though old-fashioned, was in good condition and well kept. The difficulty in receiving a sufficient quantity of good raw material was the greatest one experienced in this plant. There was no question but that the farmers were losing two or three cents on every pound of butter made because they had brought such poor cream that a first-class butter could not be made from it. Special attention is to be given this community,

*Factory No. 12*—This factory was old and in poor condition. The proprietor said that the very small quantity of cream which he was able to obtain did not justify spending any more time or money in the plant, and the farmers were not inclined to deliver good cream to such a disreputable-looking factory. The industry is needed in that community, and many farmers are willing to commence anew. A farmers' meeting in that town brought out the fact that a good getting together and starting anew was about all that was required to make a reasonably successful enterprise. At this meeting the farmers were organized into a local agricultural society, with one of its chief aims the interesting of the farmers of that vicinity in better methods of stock-raising and the advantages of dairy farming.

*Factory No. 13*—This modest little plant sprung, as have others, from a very small beginning. In this case the grocer in a small town objected to the handling of so much poor country butter, and felt that if the cream were brought to him and worked up in a little factory of his own arrangement that more profit could be made

both for the farmers and for himself. With this in mind the factory was provided with simple yet efficient machines. The experiment was a success. The greatest difficulty was in the scarcity of cream; but, the creamery being really a small sideline of a prospering mercantile business, there was no fail to it. The boy who operated the factory did many other kinds of work. A farmers' meeting was held later to develop greater dairy interest.

*Factory No. 14*—Many years ago a creamery had been promoted here, and, like many of them in that day, failed from lack of support. The present factory is a modest little structure where whole milk is received, some of which is pasteurized and shipped to the cities and the remainder skimmed and the sweet cream pasteurized and sent to the city. There is an excellent and constant demand for sweet cream in our large cities. Any factory in this State which is able to obtain sweet milk in paying quantities will find the shipping of sweet cream more profitable than the making of butter. This factory, though weak at first, has grown nicely, and bids fair to become one of the strongest in the State. A dairy meeting has been asked for at this place for some time and the request will be granted as soon as possible, but it has been a physical impossibility to meet all the demands for such meetings.

*Factory No. 15*—This is one of the most prosperous butter factories in the State. It has been co-operative in fact as well as in name, and the present prosperity is largely a result of that co-operation. The butter-maker, a sound-headed young man with good working qualities, has frequently won prizes at State contests, consequently the inspector was not surprised to find the farmers of this community delivering a good, clean, sweet cream and milk. A farmers' meeting was held later for the purpose of enlisting the farmers to more economical methods of production.

*Factory No. 16*—This individual creamery, located in a fairly good-sized town has been hanging on for years, it paying too well to make it wise to quit, yet not well enough to make it much fun to run it. A little scolding of the farmers for bringing in inferior cream, a little instruction to the operator, regarding the manipulation of the Babcock test, and a little cheering up of the proprietor with an article in the local paper addressed to the patrons of the creamery, constituted the inspection of that creamery.

*Factory No. 17*—A small individual company presided over by the son of the proprietor. There being but little dairy production about this place, an old store building had been rented for use as a factory, the milk being received on the main floor, weighed



and drawn through to the basement for separation where the churning was also done. The room being long and narrow and poorly lighted with poor drainage, the conditions were not favorable for the establishment of a flourishing home market. It seemed not to matter whether the farmers brought milk or cream, the continual sight of the only half-clean factory had aided them in the natural tendencies to drop down from a high standard until a very large per cent of the cream and milk cans inspected at that plant were very dirty. Not only was there rust and grime on the outside, but slime of long standing on the inside of the cans. The farmers bringing these cans received a kind, yet earnest scolding. Many cans had been shipped or sent in by neighbors. To each of these, which merited it, an inspection tag, notifying the owner that the can was not sufficiently clean and giving specific directions for the best methods of cleaning, was tied. Then a bit of technical instruction regarding the ripening of cream and a private roasting for the condition of the factory, and this factory was inspected.

*Factory No. 18*—This is a large centralized stock company located in one of the larger cities of the State. Though only a few years old, it is already doing a tremendous volume of business. Cream was being received by every train and from all directions. As a whole, the cream received was in fair condition. Occasionally a can of cream was received with extremely fine flavor, and occasionally a can was received in such bad shape that it was dumped into the sewer. As is common with these large plants, little or no inspection for cleanliness or instruction regarding best methods was needed. At this plant all of the cans arriving filled with cream are thoroughly washed and steamed before being returned. This guarantees at least a moderately clean receptacle for the next shipment. It is a plan which could wisely be adopted in many other factories of the State.

*Factory No. 19*—The history of this little plant, located in a small town, is interesting. It was built by the farmers in order that they might have a market. After a time it was discovered that the small quantity of goods received caused the cost of manufacture to be rather high, so when a large centralized company established a receiving station in that town the creamery was closed, and the farmers patronized the station. It was soon noticed, however, that the prices paid at this town were not what the same company was paying in other nearby towns, and it was also noticed that in those towns having a local factory the prices paid by the large company were better than in this town. The farmers

then again opened their own factory, and immediately the price paid at the receiving station shot up several points; in fact, to a point where the farmers could better afford to sell to the out-of-town company than to run their own factory, had they only been able to continue receiving such prices. Again the factory was closed, and again the price dropped. Now the farmers declare that they must continue to run their own factory in order to furnish competition, which will insure good prices for the entire community. At a meeting held at this place the farmers were urged to stand by their own concern, for, by so doing, they could soon build it up to a point where they could pay even with the large concern, and possibly better. The factory at this place was in very ordinary condition; the butter-maker, having been there many years, had drifted into the most easy methods possible, and not expecting the visit of an inspector, had not cleaned up, even periodically. The butter-maker was an intelligent young man, and was thoroughly ashamed at the condition of the factory. This young man, the same as others of his class, was given a private hearing regarding the condition of his plant.

*Factory No. 20*—A small centralized factory, located in a prosperous farming community, in a community which had for many years been engaged in the production of beef, but because of the comparative decline of the beef industry and the increased cost of nearly everything, had gone into the dairy business to the extent of milking such cows as were found on the several farms, and the selling of the cream. For several years this plant did quite well, though hard pressed by two or three larger concerns. The factory was a thoroughly good one, and had it been properly managed, there would probably have been no failure. Though it ceased operations once, it has again started, and to all appearance, is thriving. At a farmers' meeting at this place instruction and encouragement were given in the matter of production of more and better dairy goods.

*Factory No. 21*—This unfortunate institution is struggling to overcome the excessive first cost and poor arrangement of factory forced upon the farmers by a creamery building shark. The factory had been supplied with every conceivable machine and tool for the complete and thorough operation of both a butter factory and a cheese ractory. The cheese equipment has never been set up. It is today lying in the store room, dusty, and in the way. Before the end of the first summer the large cream separator, costing \$500.00, and good in its place, was shoved back to the wall, and is

now for sale cheap, because the farmers have ceased bringing milk, and bring cream. About one-half of the factory space is being used as a factory. The remainder is storage space for tools not needed. Cream was being received in poor condition and was very difficult to get at that. A few farmers were anxious for the continuance of the factory; many were luke-warm. Though the factory was not in first-class condition, encouragement, not criticism, was the thing needed.

*Factory No. 22*—This is one of Missouri's best creameries, a co-operative creamery which has proven successful, largely because of the fact that a business man has been doing the business of the company for years. Though the manager was a merchant, not a farmer, he has taken a more intelligent and active interest in the improvement of farm conditions in that community than any farmer in the place. His influence as a leader in progressive farming is worth an immeasurable amount to that community. The whole milk is still being received in this factory, and although the inspector examined about 400 cans of milk one hot morning in July, not one can of sour milk was discovered, and not one can which showed dirt of long standing, either on the inside or on the outside. Because of these conditions, it was not surprising to find the butter of exceptionally fine quality and bringing top prices. It has been the habit at this place for the members of the Board of Directors to take turns inspecting the milk as it arrives at the factory. This inspection takes place about every three or four weeks. This system is excellent, for it educates the entire community in the meaning of the word clean, and the necessity for having all milk receptacles clean. Though there was little to do in the factory in the way of instructing or inspecting, the inspector was kept busy for about three hours answering the questions of farmers regarding the selection and improvement of their stock, the building of silos, etc. At this time about half an hour's work on the part of the inspector in going out a short distance into the country to look at a supposedly pure Jersey male, was able to save an earnest young farmer the disappointment which would certainly have come, had he purchased this animal, as he was contemplating. The animal was not pure, as claimed, and was an inferior animal for any breed.

*Factory No. 23*—The first impression of this place was far from good. The butter making department of the enterprise was located in an old and small back room of a large building; the office was dingy, the floor filthy; the odor of stale eggs was constantly in

the air, for a general produce and commission business was being conducted with the butter-making department as a branch line. It was a relief, indeed, to be informed that new quarters were being erected, and that inside of two or three weeks the creamery department would be run independently and in a building especially suited to such work. The butter-maker, an energetic young man from Kansas, was working hard to keep things in shape. His personal appearance was good. The patrons of this creamery being scattered all over one or two counties, could not well be reached for the purpose of improving the quality of cream they were sending. The special work at this place for the inspector was the advising of the manager regarding the efficiency of the several pasteurizers on the market and the advisability of installing such, along with technical instruction to the butter-maker regarding temperature and per cent of acidity in connection with the pasteurizer.

*Factory No. 24*—A snugly built little factory in a section of the state most needing the rebuilding and improving influences of the dairy industry, yet appreciating it so little that the factory could scarcely be run without actual loss. By making up the sour cream into butter and the sweet cream into ice cream, and by making ice and delivering it to the stores and homes about the small town, and by cold storing articles for the merchants of town, the concern was able to operate with fair success. There is no question but that some day it will be a very decided success. But it is to be regretted that the people were induced to build so early. The town is on a railroad, which would make the shipping of cream safe and easy and really more profitable to the farmers during these infant days than would be the working up of the cream in a local factory. Two meetings have been held in this place for the purpose of encouraging the farmers to go more extensively into the production of cream. The encouragement of the manager and the instruction of the farmers were the inspection of that factory.

*Factory No. 25*—Several years ago a factory was constructed in a small town, and like many another in those days, seemed for a time to be certain to fail, and doubtless would have gone to the wall had not a thoroughly practical and personally agreeable man taken it. The individuality of the manager, coupled with the ability as a worker, and his judgment as a salesman, placed this factory on a permanent footing. Soon it was discovered that considerable higher prices could be paid the farmers if sweet milk and sweet cream were sold in St. Louis and Chicago, rather than to make the fat up into butter. The demand for sweet goods enables this

factory to pay the farmers from three to five cents a pound butter fat more than competing factories where butter only is made. The factory itself was not in first-class shape as regards cleanliness. This condition had resulted more from the fact that the men engaged were overworked than from lack of disposition. The factory had been rather poorly designed, and a great deal of labor was necessary to overcome the ill arrangement of the several machines. The inspector, because of his having had the opportunity to learn in so many different factories, was able to make some excellent suggestions regarding re-arrangement for ease in working.

*Factory No. 26*—About 15 years ago a large creamery was erected at this place, and for some time did a very flourishing business, then the factory burned, and about the same time the low price of butter on the general market made the rebuilding of doubtful economy. The factory was rebuilt, however, but soon began to decline, and for several years lay idle. Sharp competition from three directions and the following very prosperous condition of most of the farmers did not lend encouragement for its reopening. Later an enterprising young butter-maker from a northern State, took hold of it and for a time prospered, but an enlargement of the business became imperative. Recently the farmers, with the aid of the Commissioner, have organized into a co-operative company and have taken the management of affairs, retaining the former manager as butter-maker. The factory was in poor repair, but had been kept in very satisfactory condition. If the same unselfish co-operation continues, which was manifest at the time of re-organization, this creamery can and will succeed.

*Factory No. 27*—The story of this factory is that of many another; built early and all but failed because a sufficient quantity of cream could not be obtained; closed down for a number of years, and those of the community who did desire to engage in dairy work patronized a centralized creamery. Now the community is so well established in the habit of milking cows, and have also acquired the habit of spending \$20,000.00 to \$25,000.00 of cream money each year, that the local concern has again re-opened, this time as a stock company and with modern machinery. Several times has the inspector been called upon to give advice regarding the re-arrangement and enlargement of the factory and in the purchase of equipment, and twice public meetings have been held for the purpose of interesting the farmers in the production of more and better stuff.

*Factory No. 28*—About ten miles off the railroad, in an old settled community, this little creamery is struggling for life. The natural pastures are poor in that section of the State, and many of the farmers have not yet taken hold of the matter with sufficient energy to build a good tame grass pasture, or to weed out the large per cent. of cows that do not pay for their keep. The butter-maker, an earnest young man, was not satisfied, and felt that he was not being paid a sufficient salary, and when the inspector learned that \$32.00 a month was all this man received he was inclined to agree with him, until, on further questioning for the purpose of learning the young man's real qualifications for a better position, it turned out that he had never attended a dairy school and never read any dairy papers; did not know the meaning of the word "starter," and did not have enough of the science of his profession to enable him to really understand the explanation when given. Needless to say, this man will not be recommended for anything better than that which he has. The factory was in fairly good condition, though not really clean. A large amount of patient work will have to be done in this community.

*Factory No. 29*—A new co-operative creamery in an old section of the State, and in a neighborhood which produces men and women as fine as are grown anywhere, but which has very little patience with the dairy industry. Although this factory was built by a promoter, and against the judgment of the Dairy Commissioner, every means possible is being put forth to make it succeed. A thoroughly competent middle-aged man had charge of the factory, which was in good condition.

*Factory No. 30*.—Another promoted factory which has been running three years because of the perseverance and pride of the people managing it. There is room for success at this point if the perseverance and pocketbooks of the present company can hold out until the farmers become educated to the value of the industry. A two days' meeting was held at this place for the purpose of improving the productive conditions. A really amusing incident in the construction of this (promoted) plant was that the farmers had been led to believe that they could refrigerate their butter and hold it for higher prices in a little box-like room, cooled only by a few yards of water coil, through which the water from a well was to be pumped for a few hours each day. Upon inquiry it was found that the deep well water rarely ever was cooler than 60 degrees. The department is endeavoring to build up this community.

*Factory No. 31.*—A large centralized factory, with years of history and experience. Very little did this concern need in instruction regarding methods or inspection of plant.

*Factory No. 32.*—This is a very substantial little creamery, located in an old but not large town. It was built by private capital and operated for a season, then was closed for want of sufficient raw material to keep it running. The following season it opened up again under new management, which has thus far been able to secure greater patronage, making final success probable. The plant was in very good condition, in fact, it was so tidy that it was quite the pride of the town. A pretty good trade, both in butter and ice cream, was maintained largely because of this popularity. The farmers were bringing in a fairly good grade of cream in clean receptacles. The work of the inspector at this place was to instruct the boy, who was making the butter, in several points covering the method of ripening the cream and temperatures in churning.

*Factory No. 33.*—This factory offered a singular situation. Several miles off the railroad, in a quiet little town, it has been running several years, though with only modest success. The young man who owned the plant was operating it himself and making a pretty good living, but was not in a position to do anything which might in any way antagonize any of his patrons. He was an earnest worker, but failed completely in the matter of forcing or inducing the patrons to wash their milk cans and deliver clean goods. About one-half of the milk received at this factory the morning of the inspection came in cans so dirty, both inside and out, as to be positively disgraceful. Many of the cans were coated on their inner surface with a heavy yellow scum, which does not accumulate in one week, nor in a month. The inspector tied inspection tags on the cans from 33 farms, and then run out of tags. In his 15 years of work of this nature, the inspector had never before seen so large a per cent. of very dirty cans. The butter-maker had tried to urge the farmers to take better care, but whatever he said was liable to give offense, and he soon learned to keep still. In this factory there was but little instruction needed by the butter-maker, but the inspector was badly needed. Needless to say, the butter-maker was exceedingly grateful for this unexpected aid, for this was the first time in the history of the factory that an inspector had ever approached it.

*Factory No. 34.*—A new stock company, located in one of our large cities for the purpose of making butter from shipped-in

cream. The factory is new, and the butter-makers fairly competent. At this point the technique of pasteurization was the phase of the butter-making industry that needed explaining to the maker.

*Factory No. 35*.—A very substantial co-operative creamery, located in a German neighborhood in the western part of the State. These people, realizing the great value of the dairy industry, organized themselves into a co-operative company, and opened a factory in order that they might have a market. Some hand separated cream and some milk was received, but in which ever form the butter fat arrived the directors insisted that it come in good condition. Natural ice being very difficult to obtain, an artificial refrigerator had been established and was working to the great satisfaction of all concerned. The butter-maker in this factory had learned his trade in that factory, and had never visited any other. Though earnest and industrious, there were many points concerning the proper manipulation of the Babcock test and the propagation of artificial starters which he desired explained. In this factory the inspector was an instructor.

*Factory No. 36*.—A stock company in a small city had rented the building of a company once gone to the wall. This new company was compelled to overcome the bad reputation given the dairy industry by the former company, which had been unable to meet many of its obligations. The factory, though built for the purpose, was very poorly arranged, indeed. A great deal of the time and energy of the men at work was required to overcome the inconvenient arrangement of machines. Nor was that all, the factory was very hard to keep clean, consequently was not in as good condition as it should have been. It was exceedingly difficult at this point to secure cream of good quality. Add to this the difficulty the manager was having with his butter-maker, a man who, though honest, well-meaning and faithful, was so slow that it took him until three o'clock in the afternoon to make a batch of 350 pounds of butter. Another man in the testing room was equally slow. At this place it gave the inspector pleasure to be able to direct the manager to a competent and up-to-date butter-maker who was in quest of a position.

*Factory No. 37*.—A private creamery, in a pleasant old town, run by an old man. The factory was of the old style construction, with a shelf-like upper floor, which difficult to clean, and producing a dark and low room underneath. Milk was received daily at this factory, and the industrious butter-maker kept the factory reasonably clean, where the work was being done. A very good



butter was produced, and a very good price paid to the farmers. As a whole, the farmers were sufficiently careful in the cleaning of cans, though a few needed a little official jolting.

*Factory No. 38*—The creamery business of this town has a varied history. The farmers co-operated to the extent of building a factory, then co-operation among the farmers ceased, and the factory closed. Several times it has been rented, and as often closed down. At the time of the inspection the manager was having very good success. It was a combined factory, putting a feed-mill upstairs, and a creamery down, and strangely enough, the individual who had the management in his own hands was allowing the buttermilk to flow down a nearby creek, instead of mixing it with the toll obtained upstairs and converting it into pork. The idea had occurred to the man, but he did not appreciate the feeding value of buttermilk, so had not made the venture. Here the best service of the inspector was that of instructing on farm methods.

*Factory No. 39*—A stock company, located in a small city, receiving cream both locally and by shipment from towns not far distant on the railroad. Modern machinery and practical skill on the part of the butter-maker enabled this factory to turn out a very good grade of butter, and the pleasant manner of the manager had induced the patrons to take the best care of their cream and deliver it in clean cans. Though young, this company is doing an excellent business, and in time will doubtless be one of the leading of the State. A farmers' meeting was held later to help get the patrons to producing more economically.

*Factory No. 40*—This is a new factory, located in one of our larger cities. It is new, and was in good repair and good condition at the time of inspection. Naturally all the cream worked up at this plant had been shipped in. The usual difficulties experienced in connection with hand separated cream were being met at this factory.

*Factory No. 41*—A modest little creamery, making a neat little profit in a small city. The success of this venture was due solely to the energy and business ability and pleasant manner of the manager, who was also a butter-maker. Though past middle age, and with hair almost white from years, this man was a marvel for rapidity in work, turning off without friction or fuss as much work as is usually assigned two men. He said he preferred to do it rather than have the average young man around. No dirty cans were found coming to this plant, for the butter-maker would have shamed any man bringing such. No inspection was needed

here, and but little instruction, except to the farmers, who needed a great deal along the line of economy in production, which, however, holds true all over the State.

*Factory No. 42*—A receiving station for milk was established for the purpose of supplying a confectionery and bakery in a near-by city. Soon the quantity of milk and cream obtained exceeded the amount needed, and a churn was added to work up the surplus. Thus the factory became started. It is a successful little plant, and very useful to the farmers of the neighborhood, and will doubtless be continued long years after the present owner ceases to operate it. It was in good condition.

*Factory No. 43*—A handful of farmers, realizing the great advantage of dairy farming, and realizing, too, the adaptability of their part of the country for the industry, clubbed together and built a modest little factory to be run on the co-operative plan. So long as the novelty lasted, cream in paying quantities was obtained, but since then for some time it has been running because of the unselfish co-operation of a few men; one man even practically giving his time to the company two days a week to make the butter, in order that the producer might receive as great a price as possible for his butter fat. The factory was in very good condition, and the management highly deserving assistance from the State, which it shall receive.

#### LIST OF CREAMERIES IN MISSOURI.

Name.	Location.	County.	Kind.	Manager.
Agricultural College.....	Columbia.....	Boone.....	State.....	C. H. Eckles.
Altenburg Creamery Co.....	Altenburg.....	Perry.....	Co-op.....	W. J. Drumtra.
Alma Creamery Co.....	Alma.....	Lafayette...	Indiv.....	Chas. Schilling.
Arcadia Creamery Co.....	Arcadia.....	Iron.....	Co-op.....	Louis Miller.
Billings Creamery Co.....	Billings.....	Christian...	Co-op.....	J. B. Berghaus.
Blue Valley Creamery Co....	St. Joseph. .	Buchanan...	Stock.....	J. A. Walker
Blue Star Creamery Co.....	St. Joseph....	Buchanan...	Stock.....	H. I. Saferstein.
Canton Creamery Co.....	Canton.....	Lewis.....	Co-op.....	F. M. DeVilbiss.
Carrollton Creamery Co.....	Carrollton .	Carroll. .	Indiv.....	J. P. Welch.
Carpenter-Schafer Cream'y Co.	Butler.....	Bates.....	Stock.....	Carpenter & Schafer.
Clearmont Creamery Co.....	Clearmont....	Nodaway...	Stock.....	P. P. Newlon.
Clover Leaf Creamery Co....	Lockwood....	Dade.....	Indiv.....	H. Haubein.
Clinton Creamery Co.....	Clinton.....	Henry.....	Indiv.....	C. W. Michael.
Concordia Creamery Co.....	Concordia....	Pettis.....	Co-op.....	A. Bergman.
Conception Creamery Co....	Conception Jc.	Nodaway...	Stock.....	P. J. Lahr.
Corder Creamery Co.....	Corder.....	Lafayette...	Co-op.....	G. A. Frerking.
Colonial Creamery Co.....	St. Louis.....	St. Louis...	Stock.....	W. E. Redell.

## LIST OF CREAMERIES IN MISSOURI—Continued.

Name.	Location.	County.	Kind.	Manager.
Emma Creamery Co.....	Emma.....	Pettis.....	Co-op.....	L. A. Meyer.
Excelsior Creamery Co.....	Excelsior Spgs	Clay.....	Indiv.....	Thos. Morgan.
Freistatt Creamery Co.....	Freistatt.....	Lawrence...	Indiv.....	Ferdinand Worm..
Frohna Creamery Co.....	Frohna.....	Perry.....	Indiv.....	M. Mueller & Son.
Gold Bell Creamery Co.....	Greenridge...	Pettis.....	Indiv.....	F. E. Ream.
Harrison Creamery Co.....	Bethany.....	Harrison...	Stock.....	C. L. Dille.
Hannibal Creamery Co.....	Hannibal ....	Marion.....	Stock.....	Frauk Rohrer.
Hamilton Creamery Co.....	Hamilton.....	Caldwell...	Stock.....	J. H. Wines.
Holden Creamery Co.....	Holden.....	Johnson...	Co-op.....	Jas. Eldredge.
Kansas-Missouri Produce Co..	Joplin.....	Jasper.....	Stock.....	H. E. Davis.
Kirksville Creamery Co.....	Kirksville....	Adair.....	Co-op.....	J. F. Foncannon.
LaGrange Creamery Co.....	LaGrange.....	Lewis.....	Co-op.....	S. G. Lewis.
Lewis Creamery Co.....	St. Joseph....	Buchanan...	Indiv.....	Wm. Lewis.
Macon Creamery Co.....	Maeon.....	Macon.....	Stock.....	Rudolph Miller.
Mansfield Creamery Co.....	Wright.....	Mansfield...	Co-op.....	E. G. Comstock.
Maywood Creamery Co.....	Maywood....	Lewis.....	Indiv.....	Wm. Davis.
Meridan Creamery Co.....	Kansas City...	Jackson...	Stock.....	C.W. Kent.
Monroe City Creamery Co....	Monroe City...	Monroe.....	Co-op.....	H. P. Noller.
National Creamery Co.....	St. Joseph....	Buchanan...	Stock.....	Mr. Gabe.
Neosho Creamery Co.....	Neosho.....	Newton....	Indiv.....	O. P. Cozatt.
New Era Creamery Co.....	New Melle....	St. Charles..	Indiv.....	E. S. Karrenbrock.
Nixa Creamery Co.....	Nixa.....	Christian...	Co-op.....	G. W. Noker.
Oakton Creamery Co.....	Lamar.....	Barton.....	Co-op.....	Ed. Thieband.
Ozark Creamery Co.....	Springfield...	Greene.....	Stock.....	J. B. Dunlap.
Palmyra Creamery Co.....	Palmyra.....	Marion.....	Indiv.....	J. L Rohrer.
Stewartsville Creamery Co....	Stewartsville..	DeKalb....	Indiv.....	C. J. Armstrong.
Sweet Springs Creamery Co..	Sedalia.....	Pettis.....	Stock.....	Myers & Bauer.
Saline County Creamery Co...	Marshall.....	Saline.....	Stock.....	L. M. Steele.

## CHEESE FACTORY INSPECTION.

The cheese industry of Missouri is not great. There are not as many factories in the State now as there were 10 or 15 years ago. The cheese factory is peculiarly adapted to certain conditions and peculiarly unadapted to withstand certain forms of competition. The farmers of Missouri, as a whole, are prosperous, because the soil is fertile and the climate mild. While lands were comparatively cheap and labor difficult to obtain, the farmers could not afford to spend any great amount of time in the dairy phase of farming. The monotony of drawing the heavy loads of milk to the

cheese factory and drawing back the sour whey was so great that in many places near the railroad the farmers purchased hand separators and shipped cream and fed the skim milk. This has caused the decline of several cheese factories. The ideal place for a cheese factory in Missouri is back away from the railroad in some section which is blessed with pure water and pastures in abundance. The Ozark region of South Missouri will, some day, surprise America with her fine cheese.

The dairy Commissioner, acting as inspector of cheese factories of the State, met the following conditions:

*Factory No. 1*—This is an individual factory, owned by a merchant and operated by an old man, who learned the science and the practice of cheese-making in three days. The old gentleman was very courteous to the inspector, lent him considerable assistance in testing the milk of patrons as they arrived, and was pleased to learn that the State was really trying to do something for the cheese industry, yet when it was explained that the method used was not the method of our best cheese-makers, and that in fact a heavy loss had occurred during the process of converting the milk into cheese, very little interest was manifested. He preferred "the good old way," and clung to it. The factory was clean.

*Factory No. 2*—Another individual cheese factory, located many miles from the railroad, and operated during the past few years by a man who evidently possessed very singular notions regarding cleanliness. The factory was exceedingly dirty, though the testimony of the manager, who had but a few days before taken charge, was to effect that it was at the time of the inspection two hundred per cent. better than it had been during some periods of the past. The new management was putting matters right quite rapidly. One great difficulty in the past was the very poor quality of some of the milk received. Upon testing the milk of each patron with the Babcock test, carried for the purpose, and with the lactometer, it was discovered that considerable of the milk was also skimmed or watered. One patron's milk, which had arrived in a two-third's sour condition, in a can positively filthy, had also been both skimmed and watered. It was certainly the most invaluable batch of milk that could very well be delivered. The inspection tag was tied to these cans and underscored. A letter was also written to the owner on the subject. According to the report of the manager, received later, the jolt was sufficient to cause thorough cleaning of the cans. At this place also milk was delivered from the farm of a widow lady,

which milk had been heavily watered. She did not take kindly to the suggestions of improvement, and quit delivering, to the relief of the manager. Such a thing as a State Inspector of cheese factories was an unknown thing in this section. The inspection will be followed up.

*Factory No. 3*—This is a small factory doing a small business in a small town. Less than 1,000 pounds of milk were received on the morning of the inspection, but of that the maker, because of poor methods, lost about 10 per cent. of the total cheese properties of the milk. It required less than 10 minutes for the inspector to explain and show how to retain the remaining 10 per cent. The factory was reasonably clean, and what cheese was obtained was fairly good.

*Factory No. 4*—A small stock company, in a small town away from the railroad, had been running this factory for years with reasonable success. The quality of cheese, though not above criticism, was marketable, because reasonably well made in a clean factory. At this place some difficulty was experienced because of the indecent competition of cheese-makers from another State.

*Factory No. 5*—Many miles from the railroad a little cheese factory was built something over twenty years ago on a corner of the farm of a man who built and operated this factory, primarily, that he might have a market for the milk produced by his herd of good Jersey cows. A few neighbors living near also patronized the same factory. It was a shabby little place to look at, but had furnished a market, which otherwise could not have been. Upon testing the milk at this point no skimming or watering was discovered.

*Factory No. 6*—Eight miles from town this co-operative company had erected a very modest little cheese factory. It was built of local lumber, sawed at a small nearby mill, and had cost but a few hundred dollars complete. The inspector, driving out to the factory from town and arriving there at a little past six in the morning, found business well under way. It was certainly a cheerful sight seeing load after load of nice sweet milk arriving in clean shining cans and received by a young man in clean clothes and working in a factory as near spotless as an abundance of soap and water and work could make it. Under these conditions it was no surprise to find the leading dairy journals upon this man's reading table. This young man deserves assistance, and will receive it, for the State needs such men.

*Factory No. 7*—An individual enterprise, located in a small community of quite well disposed people. The factory was both new and modern, having what is unknown to the older factories—a whey tank, where it can be cleaned. This factory had been built and the patronage increased to a point where four thousand pounds of milk were being received each day. This building-up process under the first management required less than a year's time. The business was then sold, and the new proprietor, though really an expert cheese-maker, had in less than two years' time run the business down to such a point that it could not be profitably continued. The cheese was good and commanded a good price; the factory was clean; the price paid to the farmers was satisfactory; yet patronage continued to leave him, and simply because he was too short spoken, too unsociable. A sour habit cost this man his business.

*Factory No. 8*—In the building of this enterprise there is a suggestion for many small towns like the one in which this cheese factory is located. Though the town is old, the inhabitants are few. The town is surrounded by a good farming community, yet in the town itself there is very little to attract a buyer. The enterprising merchants of this town raised the necessary amount of money, which in this case was only about \$200.00, to renovate and remodel a little old feed mill that it might be used as a cheese factory. This building was then given to a private firm for a period of three years, without rent, under contract that during that length of time the ones accepting the courtesy conduct a cheese factory therein. So far the scheme has worked well. The boys operating the factory, having but little capital, were able to commence operations. The farmers obtained a market for their milk to a very good advantage, and the merchants, because of the increased trade brought to the town, very soon won back the amount of money invested in the plant. In a great many little towns some building can be found which can be worked over in much the same manner. With the lot, factory and well thus furnished by the public-spirited citizens of the town, the equipment being purchased where obtainable to best advantage, the entire factory, ready for operation, need not cost over \$500.00. The young man operating this factory, though earnest and desiring to do just right, was operating with methods which have, for the past 15 or more years, been out of date—not used by our best cheese-makers. One grave mistake which he was making was that of paying for the milk at so much per hundred pounds, regardless of its





Fig. 3. Cheese factory at Denton, Mo.



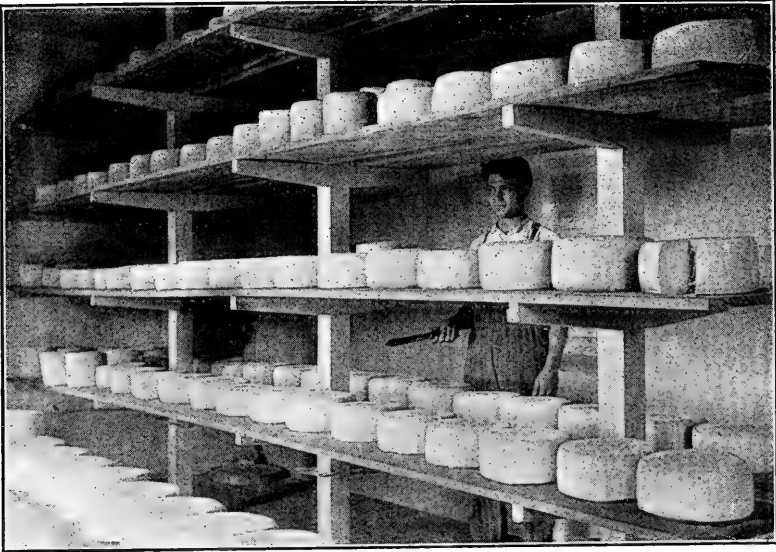
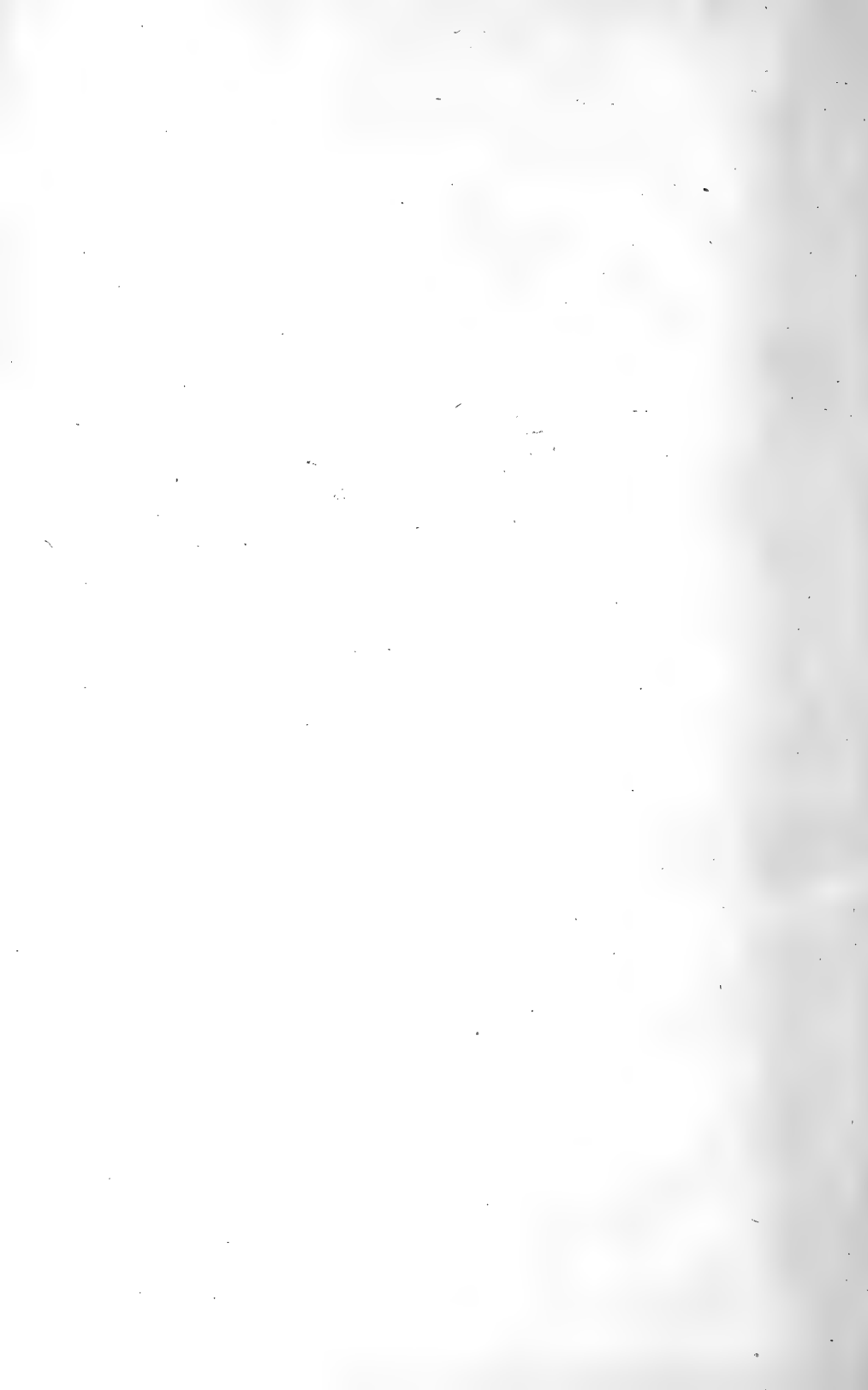


Fig. 4. Cheese curing room at Blairstown, Mo., factory.



cheese-making qualities. Learning this, the inspector was not at all surprised at the loads of milk which had been either skimmed or watered, for under that system of paying a mixture of skim milk and water would bring the same price as good, unadulterated, rich milk. The non-fatty solids in the milk delivered at that factory ranged from 6 per cent. to 9 per cent., the lower having been watered and the higher having been skimmed. The fat ranged from 7 per cent. to 5.5 per cent., the former sample having been both skimmed and watered. These are the conditions which grow up about a system of paying by the hundredweight, in which a premium is offered for dishonesty. Considerable time was spent at this factory teaching the cheese-maker how to use the Babcock test and the lactometer.

*Factory No. 9*—A new factory, located in a small but new town, and operated by its owner, an earnest, intelligent young man from a Northern State. The factory had been well built for the purpose, and a pretty good article of cheese was the result. The inspection of this factory showed the same conditions as to buying the milk by the hundredweight as described in Factory No. 8. "We treat every man alike, pay the same price to all." This was the motto of the management. It was the erroneous application of this company's motto which had developed several petty grafters in the neighborhood; one even boasting openly that he made butter to sell and still got as much for his milk as his neighbor, who was foolish enough to deliver honest goods. Nearly a whole day was spent at this plant teaching the operator how to use the Babcock test and the lactometer, and the necessity for so doing.

*Factory No. 10*—This was one of the old factories of the State, established before the days of the Babcock test, and before it was considered necessary to have a whey tank, where it could be cleaned out once in a generation. A deep cistern was dug, in which the warm whey was run daily. Imagine the mess. The milk sugar, the material which breaks down to form the acid or sourness of milk, and the milk albumen, material very similar to the white of egg, hastened in their digestion and decay by the rennet and previous filth of the cistern. For years this practice had been followed. This rotten mess was daily being drawn into the milk cans and returned to the farm, when it arrived about noon. That evening, after a nominal washing, the cans received the warm milk which on the morrow was to become cheese. The organisms of decay immediately commenced their operations. The cheese made from such milk carried the cistern odor to the market and was

graded off in flavor. The milk was purchased by the hundred-weight, and had been for years. Result: about one-fourth of the milk delivered on the morning of the inspection had been partially skimmed. A cheese made from partially skimmed milk is rubbery and hard. Add to this the flavor given by the old whey cistern, and you have the conditions which are the natural fruit of "the good old way" in cheese-making. The poorer the milk received the poorer becomes the cheese, and the smaller the price obtained for cheese the more careless the farmers become with their milk. Considerable time was spent here by the inspector in the endeavor to get these people together, make them take a square look at themselves and their conditions, and start again.

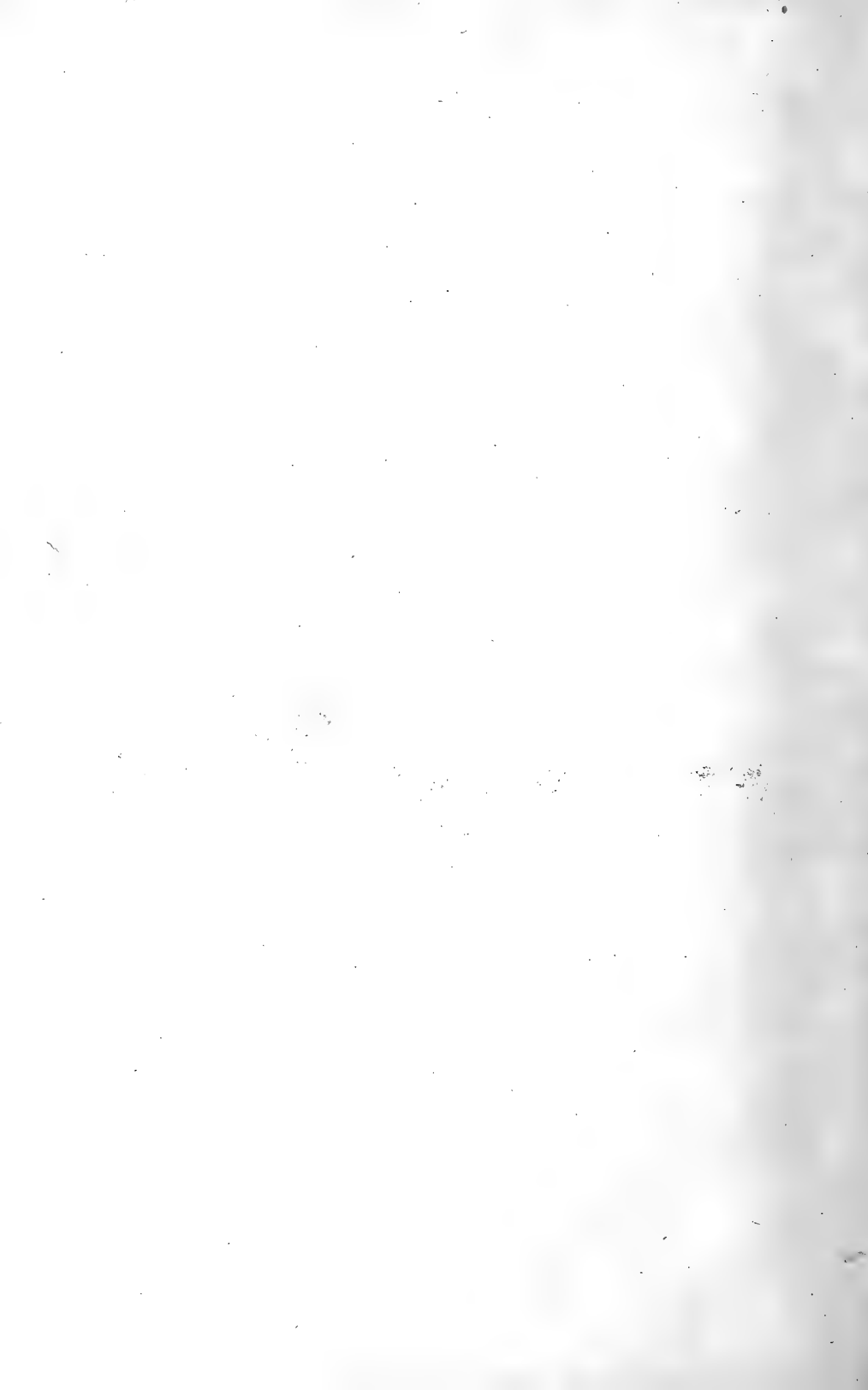
*Factory No. 11*—This fairly successful little individual cheese plant was started several years ago, before the days of the centralized creamery. The farmers, receiving a good price for their milk, continued drawing the milk, even though there had been an endeavor to run the local plant out. Although the method used in the making of the cheese at this factory was not such as used by our best cheese-makers, the maker was careful in the selection of the milk and the handling of the curd, and thus obtained a very good cheese. The whey cistern at this plant was disgusting in the extreme, it being merely a shallow well curbed up with wooden curbing. It could not be cleaned, and had never been cleaned in its many years of use. The top was open, and flies by the thousands and maggots by the quart were holding banquet in the crevices of the curbing and the corners of the well. Had the good housewives in that section of the country been one-tenth part as careless in their work as was the builder of that factory, ruin to this enterprise would have resulted.

*Factory No. 12*—An individual owned this modest little plant and operated it by himself. Because the "good old way" of doing things still in vogue, success has been very modest, perseverance and economy being the chief factors in success. Several farmers brought in milk, which had been partially skimmed, and a few brought in dirty cans. Little wonder cheese made in those states, where traveling instructors and state inspectors have worked for years, is better as a whole than that made in Missouri.

*Factory No. 13*—This factory, built many years ago, first prospered, then declined. The poor quality of milk received made it impossible for the cheese-maker to turn out a first-class cheese. The poor price paid for the milk, the farmers claimed, did not warrant putting much work into it. When upon the very verge



Fig. 5. In this shallow well, filthy from years of use without cleaning, occurred the life spoken of in criticism of factory No. 11.



of failure the company appealed to the State for assistance, it was given. The suggestions of the State's men were followed. The whey tank was elevated where it could be drained and cleaned. The cooling room was provided with better venitlation. A curd mill and racks were provided, in order that the cheese-maker might control his make in the hot summer months. That was nearly three years ago. Last summer, while in the southwestern part of the State inspecting factories, the inspector stepped into several grocery stores with the intention of finding better market for the cheese made in Missouri, and to his delight he found in one of the largest grocery stores in Joplin cheese being sold from this factory, which had once so nearly failed. The proprietor of the store informed the inspector that that cheese was better than any he could buy from New York or Wisconsin. It was top-notch cheese and bringing about two cents a pound more at that particular time than was the cheese from most other factories of the State. Good cheese can be made in Missouri, and will be as soon as farmers and the cheese-maker have a better understanding of their relations to each other and of the foundation requisites of the cheese factories.

*Factory No. 14*—This is a creamery which occasionally makes cheese when choice milk is obtainable. It makes no particular pretense at the cheese industry, though very fine cheese is made which pays well. The factory was in a very clean condition, and the cheese-maker thoroughly competent and independent of the inspector's assistance.

*Factory No. 15*—This is a little individual factory operated on the farm of the owner, largely for the benefit of himself, in order that he might have a sure market for the product of his own herd. A few neighbors contributed, but not to any great extent. The factory was in good condition, and the methods used not demanding change.

*Factory No. 16*—A little private factory, many miles from the railroad, also on the farm of the owner, who conducted the factory to furnish market for the milk of his own herd. Having the milk under his own care from the time of drawing until the cheese was sold, a very good article was produced.

There are a few Germans in Perry county, and a few Swiss in Howell county, and a few Italians in Crawford county, who make small quantities of cheese for their own use and the local market. It has been impossible to discover all such parties.

## LIST OF CHEESE FACTORIES IN MISSOURI.

Name.	Location.	County.	Kind.	Manager.
Agricultural College.....	Columbia.....	Boone.....	State.....	C. H. Eckles.
Altamont Cheese Co.....	Altamont.....	Daviess ....	Indiv.....	R. T. McCaskey.
Bolckow Cheese Co.....	Bolckow.....	Andrew.....	Indiv.....	L. E. Sargent.
Brownsdale Cheese Co.....	Pattonsburg...	Daviess ....	Indiv.....	E. C. Morrison.
California Cheese Co.....	California.....	Moniteau...	Indiv.....	J. D. McFerren.
Cainesville Cheese Co.....	Cainesville...	Harrison....	Stock.....	J. French.
Cold Springs Cheese Co.....	Cameron.....	Clinton.....	Indiv.....	C. C. McCrea.
Gem Cheese Co.....	Cameron.....	Clinton.....	Co-op.....	Harry Nelson.
Johnson Bros. Cheese Co.....	Blairstown....	Henry.....	Indiv.....	Arthur Johnson.
Johnson Bros. Cheese Co.....	Denton.....	Johnson....	Indiv.....	C. W. Johnson.
Knox Cheese Co.....	Knox City....	Knox.....	Indiv.....	E. P. Taylor.
Model Cheese Co.....	Cameron.....	Clinton.....	Co-op.....	J. T. Nicholson.
Mabel Cheese Co.....	Mabel.....	Daviess ....	Indiv.....	C. H. Hammond.
Newark Cheese Co.....	Newark.....	Knox.....	Indiv.....	.....
Pattonsburg Cheese Co.....	Pattonsburg...	Daviess ....	Indiv.....	W. H. McCaskey.
Prairie City Cheese Co.....	Rockville.....	Bates.....	Co-op.....	C. Hegnauer.

## CONDENSED MILK FACTORY INSPECTION.

The making of condensed milk is a new industry in Missouri. Two factories were built in the spring of 1906 and operated that summer with fair success. The greatest drawback for that industry in Missouri is the great difficulty of obtaining a sufficient quantity of milk. The farmers of this State are in the habit of raising large quantities of corn and large numbers of hogs, and to them the value of the skim milk for feeding purposes is so great that the extra price paid by the condensery is scarcely enough to induce them to part with this choicest of calf and pig food. As the farms become smaller and the dairymen more numerous, the condensery will come with rapidity.

*Factory No. 1*—A stock company, located in a comfortable little city, where the milk supply is pretty good. The equipment for the factory was new, and the operator apparently a very practical man. The building was well kept, and an especially good quality of condensed milk was made.

*Factory No. 2*—This is a small factory in a small town, located in a section of the country which needs the dairy industry very much. The factory was well kept, and an exceedingly good condensed milk was being made. Dairying being a new industry in that



section of the country, it was difficult to obtain a sufficient quantity. A meeting of the farmers was held, and the Commissioner lectured for the purpose of arousing interest in the industry and instructing the farmers how to produce milk more economically and how to care for it in a way which would be of most value to the condensery.

There is room in Missouri for many more condenseries, and the Commissioner will take delight in doing all possible to aid capital in locating.

LIST OF CONDENSED MILK FACTORIES IN MISSOURI.

Name.	Location.	County.	Kind.	Manager.
Victor Cond. Milk Co.....	Cameron.....	Clinton.....	Stock.....	E. J. Eakins.
Mo. Cond. Milk Co .....	Kahoka.....	Clark.....	Stock.....	A. G. Trump.

### INSPECTION OF CITY DAIRIES.

Many times, and from all parts of the State, requests have come to this Department for aid in the task of securing a better milk supply. It was with pleasure that an inspector was sent to as many towns as possible. This is an important work, and one which should receive a far greater amount of attention than it was possible to give during the past year, and although the majority of the samples tested showed a normal milk and one reasonably rich in fat, there were many samples which had been either skimmed or watered. But worse than skimming and watering is the adding of some chemical preservative, of which kind several samples were found. In some neighborhoods it is exceedingly difficult to get good milk at any price. There are several kinds of preservative on the market, each selling under its own fancy and frigid sounding name. Some samples of milk obtained would remain sweet for three and four days in the hot weather of August. Any young child taking such milk is almost certain to become ill, and, if continued, past the point of recovery.

Another and more prevalent form of bad milk was that which had been produced under such unsanitary, even filthy, conditions that it would become offensive and almost putrid before souring. Practically all milk which, upon getting old, develops gas, causing the entire mass of curd to look spongy and float, has been badly inoculated with the bacteria which develop in cow manure. The growth of these organisms, after the child has drunk the milk,

gives rise to a large proportion of the cases of stomach trouble and other digestive ailments of small children.

Every village in the State should pass ordinances requiring the inspection of the dairies supplying milk in the village. These ordinances should conform to the laws of the State, but should be carried into effect by the local authorities. There is reason to believe it would be better to have all inspection done by the State Inspector, but such is now absolutely impossible. The amount of money appropriated and the number of men who can legally be appointed are ridiculously small, compared to the vast amount of work along this line. To make this line of work, and it is a very important phase, be truly effective, there should not only be inspection of the milk as it is delivered in town, but inspection of the stables and drinking conveniences of the cows producing the milk. The inspection of stables leads to the inspection of the cows themselves, and this brings up another and very important phase of the business. The disease, tuberculosis, is already very thoroughly distributed over the State. Many herds of cows kept for dairy purposes are badly infected. In a dairy herd, under the usual mode of handling, the disease will spread rapidly, until in a few years the entire herd will become rotten with the disease, making it very dangerous for the children consuming the milk. Every village in the State should protect the infants given to its keeping by granting permits to sell milk only to such men as will provide a certificate from the State Veterinarian, to the effect that his cows are clean from this disease. It is earnestly to be hoped that in the very near future a State law will be passed governing this phase of the work, and that sufficient funds will be provided to handle it in a manner in keeping with the importance of it.

### THE OLEOMARGARINE CONDITIONS.

Early in April, 1906, the Commissioner took up the fight against the illegal sale of oleomargarine in St. Louis. As a result of a thorough investigation, it was discovered that large quantities of oleomargarine were being sold in St. Louis, and that very little of it, if any, was sold under the conditions laid down by the laws of the State of Missouri. The several market places of the city were loaded with both colored and uncolored oleomargarine, the uncolored being sold as country butter under the name of "Fresh Northern Roll," "Fresh Country Roll," etc., never saying that the article was butter, yet using such words as to lead the



Fig. 6. A typical oleo stand in St. Louis. Notice the misleading placards: "Best Country Roll." "Choice Creamery." "Best Elgin Creamery." There was no butter sold at this place.



purchaser to naturally infer that the article is butter, inasmuch as it closely resembles the real article. The colored oleo was being sold as creamery butter under the misleading names of "Fresh Creamery," "Extra Elgin," "Fancy Creamery," etc., in no case using the word butter on the placard, but in all cases deceiving the purchaser into believing that he is receiving that for which he asks. See figure 6. The use of the word "Jersey" and "Guernsey" and "Elgin," and the words "creamery" and "dairy," is very common with the apparent intent of deceiving. This imitation of butter was being sold in the amount of about \$25,000.00 worth per month, and practically all being consumed by people who believed that they were receiving the real article. Believing, as he does, that the consumer has a right to know what he is consuming, and that if he desire butter, he should receive butter, and if he desire oleomargarine, he should be allowed the privilege of using it, and believing also that the producers and manufacturers of butter have a right to the natural market for butter, the Commissioner purchased on the open market many samples of what appeared to be butter. He asked for creamery butter or dairy butter, but the chemist's analysis showed that he had received colored oleo or white oleo. The analysis of the several samples was first made by the chemist of the Agricultural Experiment Station, but the chemist resigned, his life work having been nearly completed, and it was thought best to have other analyses made by some one who would be available for court. Accordingly, samples of same goods were sent to St. Louis, where the analyses were made by Dr. Henry Dettmer in the laboratory of the city by the courtesy of Dr. Bond of the board of health and Dr. Buckland, the city chemist. It is only fair here to say that had it not been for the courtesy of Dr. Buckland, the difficulties would have been much greater. The information was finally got in shape and the cases started. Several arrests were made; then an interesting thing occurred. In about thirty-six hours after the arrest of the retail oleo dealers in St. Louis, two packing-house representatives from Chicago were in St. Louis to encourage and advise those in trouble. After some conference regarding the state of affairs, one of the gentlemen was heard to say: "We are going to shoot those Missouri State laws so d—d full of holes that those fellows will forget that they were ever living," having reference, of course, to the Commissioner who was endeavoring to do his duty in regard to these illegal sales. The cases were set for hearing some weeks ahead, for the court calendar was crowded with the quarrels resulting naturally in the fermented quarters of the big

city. The prosecuting attorney, Mr. J. D. Dalton, was interested in the cases and gave them what time he could, but it was well known that his time was crowded, and also that the oleo people would employ high grade legal assistance. It was necessary that these several cases for the State be in the hands of as good an attorney as could be found in the defendant's ranks. Mr. A. H. Roudebush was then employed to assist the State, and right here let it be said that had it not been for the generous support of Mr. S. B. Shilling and Mr. Chas. Y. Knight of the National Dairy Union in providing means for employing extra counsel, the State's cases would doubtless have fared hard.

The following shows the dates set for trial and the continuances of same:

May 1, 1906—Warrants issued.

May 23, 1906—Amended information filed.

June 15, 1906—Motion to quash filed and overruled.

June 29, 1906—Continued by court.

July 7, 1906—Continuance asked by defendants, granted.

August 24, 1906—Continuance asked by defendants, granted.

Sept. 12, 1906—Continuance asked by defendants, granted.

October 22, 1906—Continued by court.

November 24, 1906—Demurrer overruled.

Nov. 26, 1906—Continuance asked by defendants, granted.

Dec. 19, 1906—Continuance asked by defendants, granted.

January 24, 1907—Next date set for trial.

The State was ready for trial on the first date set. It has constantly endeavored to bring the matter to a conclusion, yet at this time, the close of the old year, the cases are still undecided.

Court fights are slow fights, and many are the discouraging features, and not least among these discouraging elements is the general apathy on the part of the men who should be most keenly interested—the dairy farmers of the State and the creamery managers. In the entire State of Missouri about \$50,000.00 is spent every month for oleomargarine, which is consumed as butter. The producers and manufacturers of butter have a right to that market, *and could have it, if they showed one-tenth part the active interest exhibited by the well-organized law violators.* The sum of 25 cents a year from each and every dairy farmer in Missouri, rightly used, would force these illicit dealers to be fair. It would give the consumer of butter a chance to eat butter, and it would give the poor

man, "the poor laboring man," that the oleo people profess to love so well, a chance to purchase oleo as such and at a decent price.

20 of these checks are good for  
One pound of

**Best 20-cent Creamery**

—AT—

**J.....Y CREAMERY CO.**

.....Union Market

Morgan St.Side

Fig. 7. This is a reproduction of one of the trading checks given at one of the fake butter stands in St. Louis.

Though this work is slow and unpleasant, it will be continued as long as the present incumbent is in office.

### DAIRY MEETINGS HELD.

The demand for instruction along the lines of dairy husbandry has been greater than could be supplied. Although the Commissioner, during the past year, delivered just one hundred lectures to about twenty thousand farmers of this State on subjects pertaining to "Maintenance of Soil Fertility," "Economical Milk Production," "The Weeding Out of the Unprofitable Members of the Herd," "The Experience of Missouri Farmers with the Silo," "Stable Construction for Sanitary Dairy," etc., there yet remain many communities in the State where meetings of similar nature have been asked for and where meetings will be held as soon as it is possible to do so. It is the policy of this department to co-operate with any and all other organizations, or individuals, who have for their object the up-building of the agricultural interests of Missouri. In this connection it is only fair to mention that the State Board of Agriculture has been of great assistance, many dairy meetings being held in conjunction with local corn shows, which were encouraged by the farmers' institute department of the State Board of Agriculture. The Missouri Pacific railway, through its industrial department, advertised many meetings in Southeast Missouri, which advertising was taken advantage of by the Commissioner to meet a greater number of farmers in a short space of time. The Colonial Creamery Company of St. Louis and the Blue Valley Creamery Company of St. Joseph have each, through their territorial departments, arranged series of meetings and advertised same, which greatly aided in the accomplishing of real good all over the State. Calls have come from managers of small creameries for meetings

to be held in their midst. It was always the delight of the Commissioner to respond to such calls, and when there, to organize the farmers, if they had not previously done so, into permanent little societies, which should hold meetings once a month during the winter season, and at which the old men could advise the young and the young inspire the old, and all together thresh out and weigh and sift the ideas and plans which circulate in the agricultural press.

For the farmers of Missouri to produce 100 per cent. more profit from their farms than they are producing at present is entirely possible. It is now up to the organized agricultural institutions of the State to teach the farmer how to accomplish this result.

### WRITING FOR PAPERS.

Although the agricultural lecture is by far more potent with those that receive it than would be the same things said in a paper, the modern agricultural and country newspapers reach so many more people that use has also been made of this means of reaching the people. During the past year the Commissioner has written about fifty timely articles, which were published in as many as 125 different papers the same week, making each article accessible to about one million people. A large part of this work also was done in co-operation with the State Board of Agriculture. These articles dealt with the technical points connected with the dairy industry. Several were published in the German language, as well as the English.

Just how much good has been done by this method it is impossible to determine, but the fact that the papers have frequently requested more copy of the kind indicate that they are, at least, of interest to their readers.

### NEEDED LEGISLATION.

Without desiring to create any undue prejudice or to "rake any muck," it seems best that the actual conditions regarding some phases of the dairy industry be made known.

Our large cities are crying for more milk. To supply the demand of St. Louis it is often necessary to ship in milk from Chicago. Why is milk not produced in more abundance in this State? A thorough investigation of this matter reveals several reasons why, one of which was the poor quality of the high-priced



feeds, such as bran, oil meal, cotton seed meal, etc., now being sold. Not infrequently it was found that herds of cows, being fed the usual quantity of bran with other feeds, did not produce the usual quantity of milk. The bran was found to have been adulterated with ground corn cobs and oat hulls, until its feeding value had been greatly impaired, in some cases reducing it one-half. The other grains were found also to be more or less adulterated.

The State should protect her producers.

*Cream Testing*—The advent of the centralized creameries, the hand cream separator and the Babcock tester, have solved many problems for the dairy farmer, but have brought into existence others which must be met. Scattered all over the State in a thousand different communities there are about 25,000 farmers who make a practice of selling cream, the value of which is rated by the percentage of butter fat present. The farmers, as a whole, have not the facilities for determining the grade of their own cream, and to many the whole process looks like a trick to defraud. It is but natural then that the cream buyer who gives the highest test is the one who will receive the goods.

By co-operating with the farmer in many communities this department has been convinced that in many localities gross injustice is being done. A few of the larger companies, those which buy cream in many localities, will, in a place where there is competition, test high—that is, if the cream in reality possesses 30 per cent. fat, it is called 33 or 35 per cent., and the farmer receives pay for a quantity not present. The local creamery buying only in that locality is then called upon to explain why it does not give as high tests as the other fellow. It cannot do so and live, whereas the large concern, by cutting down the test in places where there is no competition, is liable to come out even or better.

The natural result of this unfair competition is that the small company is starved out and forced to close its doors. Occasionally the representatives of some of the large concerns say openly that it is their intention to kill the small plant and then pay what they please to the farmers after that. This running out process has occurred in several places in the State and is now being attempted in many more.

At present there is no law in this State covering this offense.

*Inspection of Dairy Herds for Tuberculosis*—The number of animals now affected with this dread disease is not great, but is thoroughly distributed and is increasing. Now is the best time for stamping out the disease. In 10 or 15 years from now it will cost

the State many, many times as much, after having done untold injury.

It is earnestly to be hoped that provision will soon be made for checking this disease.

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## OPERATING THE BABCOCK TEST.

(By Frank Lee Austin.)

With over twelve continuous months of experience in operating the Babcock test in one of the large western creameries, where from three to eight hundred tests are made daily, and where the work is practiced to a fine point of correctness, I present the following outline for operating the test, which, when carefully and studiously followed, will give desirable results.

The testing of cream will first be considered. Thoroughly mix the lot of cream from which the sample is to be taken by pouring from one can to the other two or three times, or by giving it a vigorous stirring from top to bottom with a stirring ladle. Then take a sample with a sampling dipper (about three ounces), pour it in a special glass tube or jar and cover tightly to prevent any moisture from evaporating. Place this sample in a rack or tray, and take account of its position or number. Rinse the dipper in hot water between each sample, being strict to drain it before taking the next one.

The test is based on 18 grams of cream by weight. For convenience, 9 grams may be used and the reading doubled. In fact, any number of grams may be used up to 18, providing the reading is multiplied by the result obtained by dividing 18 by the number of grams used. When ready to test warm the sample and shake hard, and when it is of an even texture throughout weigh it immediately. An 18 c. c. pipette, with the lower tube broken off, is the best thing to use to conduct the sample in the bottle. Rinse the pipette between each sample in hot water, taking care that no cream and water adhere to its sides, which will increase or diminish the next sample. If any cream, even a drop, is spilled on the scales or outside of bottle, it should be removed, as it is obvious that this will rob the sample of its proper amount.

Now the sample is ready for the acid, the amount to be used of which is about equal to the amount in measurement of the cream used for the sample, depending on the strength of the acid. Its

specific gravity should be 1.82 to 1.83. If weaker than this more should be used; if stronger, less. Note that the temperature of the acid and cream should be 60° to 65° F. This is important to insure the proper action of the acid on the serum, and too much care cannot be taken at this stage. Should the temperature of either the cream or acid, or both, be considerably higher or lower, the resulting column of butterfat will be dark or light colored, with invariably an uneven lower line, which will impair a true reading of the test.

Add the acid slowly, letting it run down the sides of the bottle's neck; at the same time turn the bottle to wash down all the cream sticking to the neck. Do not allow the acid to drop directly into the cream. When a number of samples are being tested at one time, it is best not to shake the bottles until the acid has been added to all in the lot. The acid, which is heavier, will sink to the bottom and remain distinctly separate from the cream until shaken. It is a convenient thing to have a wood tray, made out of a two-inch piece, with holes bored deep enough to hold the bottles; then, when the acid is added to all, the tray can be shaken vigorously and all will be mixed at once. Thus the acid has a chance to act equally on all. The mixture will pass through various stages of color to a dark brown or purplish brown, when the shaking should cease. Immediately add warm water, bringing the butterfat up in the bottle to the bottom of the neck. This is done before the first run in the machine is made, and prevents further action of the acid and allows the fat to rise up through the water and become clarified. A good test may be gotten by omitting this step, but there is no certainty of it. Now make the first run in the machine of five minutes. At the end of the first run fill the bottles with hot water, 130 to 140° F., to within about half an inch of the top, and run one full minute. During the whole run the speed should be kept up steadily and enough steam let into the bottle chamber to keep the temperature up to 130° F. When the machine stops the temperature of the fat column should be about 120° F., and the reading taken at once. The reading is most conveniently made with a pair of dividers. Measure the fat column from the extreme lower line to the lower part of the distinct curve, or meniscus, as it is called, at the top of the column. Then place the lower point of the dividers at zero and the upper point gives the reading. This reading is correct enough for all practical purposes, providing the fat column is of a rich amber color, clear-cut, and at a temperature close to 120° F.

For very fine work, Ed. H. Webster of the U. S. Dept. of

Agriculture, who has made exhaustive experiments in cream testing, says, "read the fat column from the extreme top to the extreme bottom lines; then read the depth of the meniscus and deduct four-fifths of it from the previous reading and add 0.2 per cent. to the result." This 0.2 per cent, it is estimated, is the amount adhering to the sides of the bottle below the fat column. This is of value in experimental work, but need not be considered in ordinary practice.

In testing milk the same outline should be followed, excepting do not add the hot water before the first run. Milk may be weighed or measured with a 17.6 c. c. pipette. The same also applies to skimmed milk and buttermilk. The reading of milk, however, should be taken from extreme top to extreme bottom.

In the creamery work of the present day the test is an important factor. On it depends what the patrons shall be paid. The operator must remember that this very small amount of cream represents a very large amount in proportion to its size. A little carelessness will make a big difference in the result, and so the standard for the operator to follow should be carefulness and good judgment.

(Mr. Austin prepared the above paper on testing, at the request of the Commissioner, for the particular benefit of several creamery butter-makers, who are having trouble in getting uniform results in testing. During the past year Mr. Austin has personally tested about 100,000 samples of cream.)

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## REFRIGERATION OF BUTTER AND CHEESE.

(By C. E. Gray).

The subject, "Refrigeration of Butter and Cheese," suggests only at first thought the holding of the products at low temperatures, as in transportation or cold storage. However, I do not wish to limit the subject to this alone. While refrigeration (and I refer especially to refrigeration produced by artificial means) is an important factor in the storing of butter and cheese, it has a place in the manufacture of butter and in the ripening of cheese which must not be overlooked. I hope the time is not far distant when refrigeration may be generally used in the preserving of raw materials, the milk and the cream from which the butter and cheese are made. There is certainly great need of better methods for pre-

serving the raw material, thereby improving the quality of the final products. Holding the milk and cream at low temperatures seems to be the most feasible means of accomplishing the desired results. I shall refer to the possibilities of milk and cream refrigeration later.

In the manufacture of butter it has been proven beyond a doubt that in order to make a uniform product definite methods must be followed. This means definite temperatures for ripening cream, for cooling cream, for churning, and definite temperatures for washing the butter, all of which are lower than the summer atmospheric, and necessitate the use of natural ice or artificial refrigeration.

In the United States we have today about 8,000 creameries, only a small percentage of which are equipped with refrigerating apparatus. All others are dependent on natural ice for cooling. This, where the supply is sufficient each year, is quite satisfactory, but in no case as satisfactory or convenient as refrigeration produced by artificial means. For these reasons and because the supply of natural ice is not always sufficient, especially as we go farther south, many creameries are each year installing refrigerating apparatus. There is quite an opening along this line for the manufacturer of small plants of ten tons capacity or less, machines which are simple in construction and easy to operate.

#### EFFECT OF STORAGE ON BUTTER.

Of all food products held in storage, butter is at least second in importance. Unfortunately, the uncertainties of butter storage are perhaps greater than those of the storage of other products. If butter, when placed in storage, would remain unchanged during a period of six to nine months, we would consider the results very near ideal, and when such results are obtained, the stored article will have advantage over the fresh article for this reason. During summer months (the season of storing) the quality of butter is generally recognized as being materially better than of that made during the winter months (the season of removing from storage). I feel perfectly safe in stating that there is butter in storage today, placed there last June, which is now as good, if not better, than what is being made at the present date. Stored in the same room with this is other butter, which seemed equally good at the time of storing, but which now has characteristic cold storage flavors. This is an occurrence of too great frequency. Why this deteriora-

tion occurs in some and not in all the butter, is a problem yet to be solved. One thing which seems to be very certain is that the development of undesirable flavors cannot be wholly prevented by holding butter at low temperatures, at least at such low temperatures as would be practical for general storage. If we read articles on the storage of butter, published only a few years ago, we find 20 degrees F. given as suitable temperature, and the lowest temperatures suggested are about 5 above zero. Storers of butter have each year been demanding lower temperatures, until now we find very few butter rooms held above zero, many lower, and a few as much as 10 degrees F. below zero. If it were practical, I presume still lower temperatures would be used, as ideal results have not yet been obtained. I believe you refrigerating engineers have done towards producing storage which will give satisfactory results all that you should be asked to do, perhaps more. You are holding butter rooms at temperatures lower than you are for storing other food products. It seems wholly reasonable that the manufacturer of butter should be asked to take a part, and, if necessary, make a butter especially for storing. It is along this line that the Dairy Division of the United States Department of Agriculture is working.

#### STUDYING KEEPING QUALITIES.

We are this year studying keeping qualities of butter as affected by "ripening" (i. e., the sourness of the cream at the time of churning). We have in storage butter from cream having varying amounts of acidity, ranging from perfectly sweet to what is termed "over-ripe." We are also giving attention to the effects of pasteurization. While we have not been able to make a butter perfectly sterile, we have made some which was more nearly free from organized and unorganized ferments than ordinary butter. Most of the butter was carefully analyzed, both chemically and bacteriologically, at the time of placing it in store, and will be again analyzed when removed. The first lot will be taken from storage the 15th of this month. This investigation will undoubtedly give some very interesting, and, we hope, valuable results. The work of 1905 has been published in Bulletin No. 84 of the Bureau of Animal Industry. Doubtless many of you have read this publication. However, I wish to refer to it briefly.

The object of the investigation, reported in this bulletin, is to study the keeping qualities of butter:

1. As affected by temperature of storing.

2. As affected by pasteurization of cream.
3. As affected by salting.
4. As affected by package in which it is stored, as (a) tubs and (b) cans, so-called, hermetically sealed.
5. As affected by air in package, as in (a) can full, and (b) cans partially full.

The results which I consider worthy of mention are, first, that there was not a great difference between the keeping qualities of butter stored at  $-10$  degrees F. and at  $+10$  degrees F., the average difference of all scores being .51 points in favor  $-10$  degrees. Between  $-10$  and  $+32$  there was a marked difference in favor of the lower temperature. Another point of interest is that butter in cans, so-called, hermetically sealed, kept no better than butter in tubs. When the cans were not filled completely full, the deterioration was much greater than when the cans were filled. This deterioration was undoubtedly due to the butter coming in contact with air in the package. I think it has been generally recognized that butter must not be exposed to air while it is in storage, and that it is advantageous to have butter packed solid and in large packages. Butter having higher percentages of salt did not keep as well as that with lower salting.

#### GOOD BUTTER ESSENTIAL.

In studying the keeping qualities of this butter after removing it from storage, the following, which seems of great importance, was noted: That butter made from cream of good quality was far superior ten days after removing from storage to the butter made from cream of inferior quality. With our present knowledge of the storing of butter, it seems necessary to store good butter in order to have it at all desirable any length of time after removing from store. It seems that this fact may hold true when storing cheese. It is the opinion of Mr. Doane, expert in charge of cheese investigations for the Dairy Division, that very often cheese, which seems poor enough at the time of storing to warrant a cut in price, comes out of storage a few months later of such quality as to bring the highest market price.

The Dairy Division is conducting investigations along this line, attempting to determine definitely whether or not poor cheese does become of better quality when ripened at low temperatures. Other work is being done with the object of determining what temperatures give the most desirable results, and how soon after making the cheese should be placed under refrigeration. Results

thus far obtained indicate that it is desirable to place the cheese as soon as possible after making it in cold rooms. Temperatures below 35 degrees F. have given very satisfactory results. It seems that the most satisfactory method of ripening cheese will necessitate artificial refrigeration, also that it will be desirable to have the refrigerated curing rooms as near as possible to the cheese factories, in order that the cheese soon after making may be placed in them. If these facts are established there will be an additional demand for refrigerating apparatus.

I wish to now refer briefly to the refrigeration of milk and cream. To manufacture good butter, and we must have *good* butter if we wish to store it, we must have good cream, and to manufacture *good cheese* a milk of good quality is essential. The tendency is for producers of milk and cream to make less frequent deliveries to the cheese factory and creamery than formerly. This is especially true regarding producers of cream since the introduction of the hand cream separator. There could be no objection to this less frequent delivery if the quality of the product was good. However, it has not been. The average quality of the butter of the United States has the last few years been becoming poorer rather than better, owing to the increased use of the hand separator and less frequent delivery of the cream.

#### HOLDING MILK AND CREAM.

What is now needed is a satisfactory method of holding the milk and cream in good condition up to the time of delivery. The length of time which milk and cream can be held in good condition is determined by two things, the cleanliness with which it is handled and the temperature at which it is held. We would not like to admit that refrigeration is more essential than cleanliness, but we know this to be true. By using the greatest precaution in milking and handling milk and cream, it is practically impossible to obtain it absolutely free from bacteria. When we think of the rapidity with which bacteria multiply, conditions being favorable, a single bacterium reproducing itself in from 15 to 40 minutes, we realize that milk held at ordinary temperatures, in the course of twenty-four hours will contain many million per c. c. One of the easiest methods of arresting the development of bacteria is by subjecting them to cold. What the producer needs is refrigeration. Nothing could do more toward the producing of good butter and good cheese than the holding of the milk and cream at low temperatures from the time of milking up to the time of de-



livery at the creamery or cheese factory. Knowing this, the Dairy Division of the United States Department of Agriculture, also the dairy sections of the various experiment stations and colleges, are doing what they can to induce the farmers and dairymen to use water and natural ice for cooling.

The Dairy Division has been sending out plans for building ice houses, and giving the information they can regarding the benefits to be derived from the use of ice. In some sections of the country, where the possibilities for producing milk are greatest, natural ice is nearly unknown. The producer in these sections is almost wholly dependent upon artificial refrigeration, and at the present time has very little.

Let us review briefly the relations of refrigeration to butter and cheese:

To obtain the best finished products we ought to have it for preserving the raw materials (milk and cream). To obtain a uniform grade of butter we are dependent upon definite temperature during the process of manufacture. We must have cold storage to keep butter from the period of greatest production until time of shortage. The value of cold curing of cheese is each year being better understood. The manifold relations between refrigeration and dairy products make us aware of what we owe the refrigerating engineers.

I wish to assure you, in behalf of the dairy interests of the country, that your work is appreciated, but we wish to impress you, both collectively and individually, with one possibility as yet undeveloped, that of refrigerating apparatus simple enough, cheap enough and efficient enough to be of practical value to every dairy farmer.

The following was said in the discussion on Mr. Gray's paper:

S. P. Stevenson: I would like to ask Mr. Gray whether the temperature of cold storage rooms for cheese should be held lower than 32 degrees. I believe he said that cheese should be stored between 35 degrees and freezing.

C. E. Gray: So far as I know, very little has been done in holding cheese lower than 32 degrees. In my paper I meant between 35 and 32 Fahrenheit. I think it has been found desirable to use temperatures lower than 32, but very near that point.

John E. Starr: I would like to ask Mr. Gray if the low temperature limit for long storage butter has been reached. He states, and as many of us know, that butter is now being stored as

low as 10 below zero, and I think it would be very interesting to know how much further we have got to go, if any.

C. E. Gray: That is something which will have to be taken up, providing a different method for manufacturing butter does not remedy the difficulty. So far as I know, nothing has been done in holding butter lower than 10 degrees below zero, and we find from the results obtained that there is very little difference between 10 above zero and 10 below. We might assume from that that lower temperatures would not be of much greater value, and then, when we employ a lower temperature than 10 degrees below zero, will find the proposition quite an expensive one. At least, I have been led to believe so. What we hope to be able to accomplish is to manufacture butter which will keep at temperatures a little above zero, perhaps as much as 10 degrees above.

John E. Starr: There is a marked difference between 10 degrees above and 10 degrees below.

C. E. Gray: Yes, there is a marked difference, but as we go above 10 degrees above zero we also find a marked difference in the keeping of the butter.

Carl W. Vollman: I should like to ask Mr. Gray if he has in any way ascertained the effect of the impurities in the air in the storage room on the goods stored therein. Perhaps I should mention, before asking for an answer, that when refrigeration was proposed—I am talking now of some years back, when the export of frozen goods from the British Colonies, New Zealand and Australia, commenced—when these goods were stored in London, we found, although the temperature was kept low, we could not prevent mould growing on the carcasses. At that time we tried to overcome the formation of the mould by lowering temperatures, and, although we retarded the growth of the mould, we could not prevent its formation, and, when investigating the matter more thoroughly, we found that it was mostly due to the impurities of the air, that, to a certain extent, as we expressed it at the time, all stored goods, all perishable goods, breathe after they are stored. They absorb a certain amount of air and give off impurities, and these impurities settled on the goods stored. If we could keep these impurities out of the air, by removing them from the circulating air, we found that we could obtain better results with higher temperatures than with lower temperatures. The reason why I mention this matter is that if the Agricultural Department has not investigated along this line it would, perhaps, be well for them to do so, as they have facilities and can make investigations wher-

ever they like. They could make such investigations to find out whether by keeping the air absolutely pure, or as far as possibly so, if they cannot have better results and retain the natural flavor of the goods.

C. E. Gray: In reply to the gentleman's remarks, I may say that in the storage rooms we have attempted to keep the air as pure as possible. Of course, we know that where butter is exposed to air which has bad odors the odors would be absorbed. Butter in cans hermetically sealed, practically hermetically sealed, really kept no better than butter in tubs, which would indicate that pure air would not solve the problem.

(The above address was delivered by Mr. Gray before the Sixteenth Annual Convention of the American Warehousemen's Association, St. Louis, Missouri, December 5, 6 and 7, 1906, and reported in the December issue of Cold Storage and Ice Trade Journal.)

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## BUTTER TESTS.

(By T. S. McPheeters.)

We beg herewith to submit some information relative to some experiments we have been making on five tubs of creamery butter (full milk) and grading about 94, delivered to us on August 13, and disposed of as recited below. We had these tubs inspected when they came into our warehouse by Mr. W. N. Tivy, one of the best recognized butter experts in the city of St. Louis, and all of the subsequent inspections referred to below were made by him in conjunction with Mr. Hewes, our superintendent, and the conclusions reached were in all cases unanimous. The different inspections on the five tubs were as follows:

### TUB NO. 1.

August 13.—Received and placed in butter room C/6. Inspected at the time. Temperature of the room, zero. 30-lb. tub.

August 29.—This butter was inspected by Mr. Tivy, who found no change. Was then placed in C/2 with meat after being frozen. This room used as a storage room for meat.

September 5.—This butter inspected by Mr. Tivy, who found no change since previous inspection.

September 17.—Inspected by Mr. Tivy. No change since last inspection.

November 2.—Inspected by Mr. Tivy. No change since last inspection.

TUB NO. 2.

August 13.—Received and placed in fish room B/5. Inspected at the time. Temperature of the room, -1. 30-lb. tub.

August 14.—Examined by Mr. Hewes at 10:00 a. m. Free from all odors, although package smelled of the fish. The butter not yet frozen.

August 15.—Examined by Mr. Tivy and Mr. Hewes at 2:00 p. m. No change from day before, except that butter was more frozen.

August 17.—No material change from the 15th.

August 21.—No material change. A slight flavor on top, but not strong enough to tell what it was.

August 24.—No change since the 21st. Can detect no fish flavor. Inspected by Mr. Tivy and Mr. Hewes at 2:00 p. m.

August 29.—No perceptible change. Top tasted very little of the tub, but no fish flavor or smell. Inspected by Mr. Tivy.

September 5.—Inspected by Mr. Tivy. No change since last inspection. Fish flavor cannot be detected.

September 17.—Inspected by Mr. Tivy, who found no change since last inspection.

November 2.—Inspected by Mr. Tivy. No change since last inspection. Tub was badly moulded on sides when packed, but does not show on the paper lining.

TUB NO. 3.

August 13.—Received and placed in butter room C/6. Temperature zero.

August 29.—Inspected by Mr. Tivy. No perceptible change. Was then placed in fish room B/5 with No. 2 tub. Was thoroughly frozen in butter room.

September 5.—Inspected by Mr. Tivy. No change and no odor of fish.

September 17.—Inspected by Mr. Tivy, who found no change.

November 2.—Inspected by Mr. Tivy, who found no change since last inspection.

TUB NO. 4.

August 13.—Received and placed in lemon room. Temperature of the room at the time, 43.

August 14.—Examined by Mr. Hewes at 10:00 a. m. Butter free from all odor; also the package.

August 15.—Mr. Tivy and Mr. Hewes examined this butter at 2:00 p. m. and found it free from all odors. Higher flavor than No. 2 tub.

August 17.—Inspected by Mr. Tivy and Mr. Hewes. Tasted slightly of lemon and had some odor.

August 21.—Inspected by Mr. Tivy and Mr. Hewes. Lemon flavor had penetrated top two inches.

August 24.—Lemon flavor worked down  $2\frac{1}{2}$  inches from top; also shows on sides of tub.

August 29.—Lemon flavor down  $3\frac{1}{2}$  inches. Strongest on top of butter. Inspected by Mr. Tivy.

September 5.—Inspected by Mr. Tivy. Lemon flavor had penetrated a little deeper, but no stronger on top of tub.

September 17.—Inspected by Mr. Tivy, who found that the lemon flavor had penetrated deeper, and the flavor stronger deep down.

November 2.—Inspected by Mr. Tivy, who found that lemon flavor was not as strong, but had penetrated clear through the tub, and becoming off flavor by being carried in high temperature.

#### TUB NO. 5.

August 13.—Received and placed in meat room C/4. Temperature of the room at the time, zero. This room is used as a freezing room for export meat.

August 17.—No material change from first inspection. Partly frozen.

August 21.—No material change from first inspection.

August 24.—No change from previous inspection.

September 5.—Inspected by Mr. Tivy, who says flavor on top of tub not quite as good as it was when last inspected. No distinct flavor.

November 2.—Inspected by Mr. Tivy. No change since last inspection.

The last inspection on these tubs of butter was made on December 3 by two disinterested parties, Mr. F. W. Brockman of this city, one of our most prominent commission men, and Mr. R. M. Washburn, State Dairy Commissioner for the State of Missouri. Their inspection follows:

## TUB NO. 1.

Mr. F. W. Brockman.  
No odor; flavor good.

Mr. R. M. Washburn.  
Thin surface flavor of wood;  
body free from any foreign  
flavor.

## TUB NO. 2.

Hard frozen; no odor; flavor  
good.

Same as No. 1.

## TUB NO. 3.

Top has foreign odor; body off  
in flavor.

Top surface has nasty flavor  
 $\frac{1}{4}$  inch deep; below this a good  
butter, and no foreign odor.

## TUB NO. 4.

Flavor of citrous fruit.

Strong flavor of fruit at depth  
of 2 inches; very strong on sur-  
face.

## TUB NO. 5.

Top has fruit odor; body no  
flavor.

Not as good butter as other  
tubs, but no foreign flavors  
even on top, although the thin  
surface has unclean taste.

The five tubs each showed small, decided mould stains in going in. There was no increase whatever in the mould, except to the tub in the fruit room, which stained the lining paper slightly, but did not penetrate to the butter.

From these tables the first conclusions that we would draw are in regard to the tubs Nos. 3 and 4, placed in the lemon room. These tubs were taken from an outside temperature of say 85, and placed in the lemon room with a temperature of 43. This room was full of oranges and lemons. The first forty-eight hours the butter was not affected, but later on it was affected, but the length of time before it was affected was an important fact.

The second conclusion is that the tub, that was taken from a temperature of atmosphere and placed in the fish room, and there

frozen, which took forty-eight hours, seems to be as free from odors and tastes of all kinds as the tubs that were taken from atmosphere and placed in the butter room. This would seem to indicate that fish odors are not as dangerous as we are wont to think them.

Another interesting fact with reference to tub No. 5 is that Mr. Brockman, who is an expert in butter, announces the odor that he discovered as being a fruity odor, although this tub had not been near any fruit. Our conclusion is that experts are wont to call odors that they do not know what they are as fruit odors, which does not necessarily mean that they have been contaminated by fruit.

We suggest that next year each of the members of the Cold Storage Department buy a tub of butter, and put it in some room with other commodities and freeze it, reporting the results of their experiment at the next convention. If reports are shown from fifteen to twenty plants, it could be conclusively shown that butter taken from temperature and put into a fish room or some other room with a strong odor and frozen, and did not take the odor, it would go a long ways towards establishing the fact that the dangers which, up to this time, have been thought serious, are largely imaginary.

(Mr. McPheeters conducted the above described test in order to learn the truth regarding the subject. His paper was read before the Sixteenth Annual Convention of the American Warehousemen's Association, and reported in the December issue of Cold Storage and Ice Trade Journal.)

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## REFRIGERATION.

(By R. H. Tait.)

Lower temperatures than that of our ordinary summer atmosphere are as necessary as scrupulous cleanliness in handling dairy products, and the refrigerator, where temperature of the product is reduced or where it is held, should be kept as clean and wholesome as all the other apparatus used in handling the product.

*Refrigeration with Ice*—The commonest kind of a small refrigerator is a compartment or box to contain the goods to be stored, with an ice space so arranged that the cooling effect of the

ice will produce a circulation of the air over and around the goods and throughout the entire closed space, and in proportion as this circulation is properly maintained, provided the ice is pure and of sufficient quantity, will the refrigerator keep the product stored in good condition? To build a refrigerator without regard to its circulation is a mistake, as goods will not carry in good condition in boxes without circulation, even though the required temperature be maintained. A good ice-cooled refrigerator, properly designed and insulated, is the most economical method of cold storing goods in small quantities, and every farmer handling dairy products should be provided with one. The ice box on the farm, when once used, quickly ceases to be a luxury, and becomes a necessity, for having used it once, the farmer will not be without it. The creamery must be equipped with a refrigerator of sufficient capacity, to not only reduce the material received to the required temperature for the most economical working, but to store the finished product at an even temperature until it is shipped.

*Artificial Refrigeration*—For refrigerating goods in greater quantities and in maintaining low temperatures in larger spaces, mechanical refrigeration has almost entirely taken place of ice, it being not only better, but cheaper. Machinery for this purpose has been brought to a high grade of efficiency, and can be installed for reasonable cost.

Refrigerating machines are nominally rated as of being of so many tons refrigeration per day of twenty-four hours. This expression means that, for instance, a ten-ton machine and apparatus will extract as much heat, or, in other words, do as much refrigerating when operated continuously for twenty-four hours as would be done by the melting of ten tons of ice.

*Determining the Size Needed*—Knowing the amount of material to be cooled, through how many degrees it is to be cooled, and the time the cooling is to be done, the engineer readily proportions the apparatus to the work required. Add to this the requirements for the storage space, and the capacity of the apparatus is determined. Assuming a condition which would require the maximum amount of work for a refrigerating plant, average outside temperature of 80 degrees F., required inside temperature of storage 32 degrees to 40 degrees, a creamery which has 2,500 pounds of cream coming in at a temperature of 80 degrees, which must be reduced to 40 degrees, and a storage space, say 15'x10'x10' high, will require about 1.2 tons of refrigeration per day, and a machine of 1.2 tons capacity, operating continuously during the twenty-four



hours, would do the work, but there is an element of time in which the work is to be done entering into the operation which will change the calculation. It is not desirable to operate the plant to full capacity twenty-four hours, but the refrigerating work should be done at the time the other work is being attended to. If it is resired to operate the plant twelve hours a day, the capacity of the apparatus must be doubled. If the operating period is eight hours, then we multiply our required result, or 1.2 tons by three, which would show a 3.6 ton apparatus would do the work. Conditions vary so much that it is impossible to state exactly what tonnage apparatus would be required by all creameries handling a given number of pounds of cream per day. These differences arise from general temperature conditions, supply of water available, and temperature of same, character of insulation and apparatus, length of time of operation, unavoidable losses, etc., but in a general way here has been shown approximately capacities of plants for certain duties. Assuming a maximum atmospheric temperature of 80 degrees storage space, temperature of 40 degrees:

Pounds cream per day.	Room, feet.	For 8 hours operation, tonnage of apparatus.....	Nearest commercial size..	Weight of apparatus.....	Price (f. o. b., St. Louis)....
2,500 .....	15x10x10	3.5	(4)	13,000	\$1,375 00
12,500 .....	15x15x10	8.	(10)	26,000	2,306 00
25,000 .....	25x25x10	16.5	(20)	47,000	3,624 00

Operation varies widely in cost per ton in different plants and with different arrangement and combinations, but may be roughly stated from \$1.00 to \$2.50 per ton.

In most places of sufficient importance to install a creamery and refrigerating plant, cold storage space can be profitably rented to meat, fruit, vegetable or poultry dealers, and it would be well in calculating apparatus to consider this important item. In many places a freezing tank could be made a source of profit by supplying ice to patrons or to the town trade.

(Mr. Tait, a refrigerating engineer of St. Louis, wrote the above article at the request of the Dairy Commissioner for the benefit of the creamery managers of the State who may desire to install such machinery.)



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## PART II.

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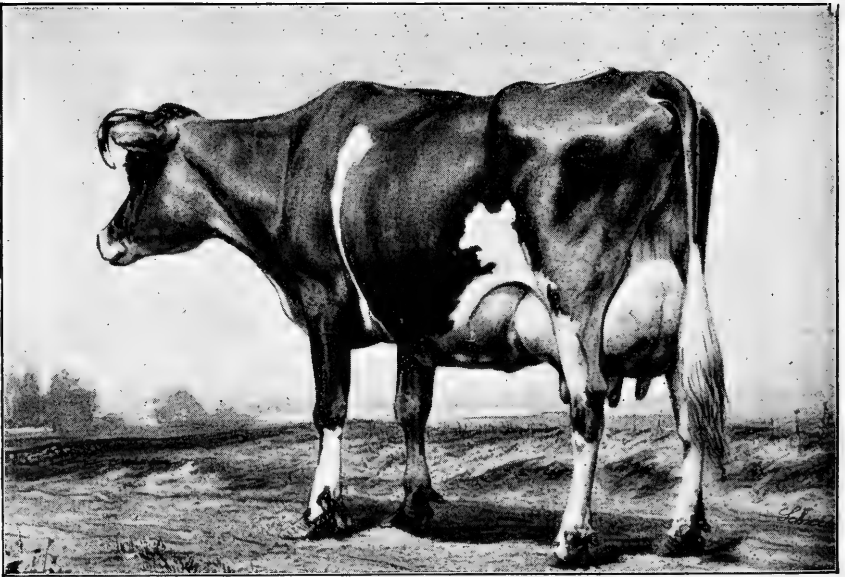


Fig. 11. Here is a producer. Compare her form with that of No. 8.

# THE IMPROVEMENT OF MISSOURI HERDS.

## WHY AND HOW?

The increase in the standard and cost of living of the American people, the greatly increased demand for higher education and the increase in the price of land in this State, have all worked together to make it necessary for the farmer to make more money. With his farm gradually becoming less productive, while at the same time being taxed as though worth more, how is he to do this? He must keep stock in order to save his land. Most farmers now possess a goodly number. How to handle this stock in order to realize the most from it is now the most vital question before the Missouri farmer. The time has passed when he can afford to keep a cow the entire year for her calf only. She must do more. About twenty-five thousand farmers of this State have already solved this question in a measure by using the cows that they have in a dual capacity. Those cows must now produce milk and cream for market as well as raise their young. This group of dairy farmers, or balanced farmers, have learned that by milking their cows and selling the cream they can and do receive from twenty-five to seventy-five dollars a year from each cow, and still raise the calf as well as before. The following table shows sums actually obtained by the patrons of different small creameries in this State:

Name.	Address.	No. cows.	No. of months.	Money received	Cow per month.	Cow per year.
J. A.....	Kirksville.....	8	12	\$393	\$3 98	\$47 87
J. S. B.....	" .....	6	4	113	4 70	.....
G. W.....	" .....	9	10	233	2 58	.....
W. F. P.....	Lovelake.....	6	9	149	2 75	.....
H. R.....	Corder.....	12	12	572	3 87	47 66
C. B.....	" .....	12	12	673	4 67	56 08
D. G.....	Holden.....	20	12	1,002	4 17	50 10
J. E.....	" .....	8	12	413	4 27	51 25

Name.	Address.	No. cows.	No. of months.	Money received	Cow per month.	Cow per year.
A. O.....	Sweet Springs.....	8	6	\$173	\$3 58	.....
A. H. K.....	" " .....	10	6	233	3 88	.....
W. L. H.....	" " .....	10	6	215	3 58	.....
J. B. B.....	Billings.....	2	12	94	3 91	\$47 00
J. J. K.....	" .....	7	12	276	3 28	39 42
G. H.....	" .....	7	12	335	3 98	47 85
W. A.....	" .....	10	12	427	3 50	42 00
A. D.....	" .....	10	12	336	2 80	33 60
C. R.....	Palmyra .....	28	12	1,550	4 61	55 35
B. R.....	" .....	16	12	1,052	5 47	65 75
F. G.....	" .....	18	12	1,228	5 59	67 11
L. G.....	" .....	12	12	780	5 41	65 00
W. E. B ....	Carrollton.....	25	12	918	3 06	36 72
J. W.....	" .....	7	12	216	2 57	38 85
F. D.....	Hamilton.....	14	12	563	3 35	40 21
H. G.....	" .....	12	12	495	3 43	41 25
J. S.....	Lamar.....	8	9	289	4 01	.....
C. F. B.....	" .....	15	12	659	3 66	43 93
E. F.....	" .....	16	12	685	3 56	42 81
N. M.....	" .....	15	4	180	3 00	.....
R. W. S.....	Valley Park.....	3	2 $\frac{3}{4}$	43	5 40	.....
L. A. M.....	Emma.....	8	12	461	4 80	57 62
C. W.....	" .....	11	12	507	3 84	46 09
H. H.....	La Grange.....	6	12	447	6 20	74 50
A. M. H.....	" .....	17	12	1,258	6 31	75 76

The above figures show only the money actually obtained from the sale of cream, not what the cows produced. We do not know how many people consumed milk, cream and butter at home. It would naturally be expected that those cows in a large herd should show a better average record than those in a small herd because of this home consumption.

Notice in the above table that the smallest yearly return for one cow is \$33.60. This figure is not great, neither does it represent the entire year's earning of the cow. Her calf, raised on skim milk, was worth as much as it would have been had it consumed that \$33.60 worth of fat. Moreover, pigs were fed on the excess milk, which would again raise the real valuation of the cow when used in a dairy manner.







Fig. 8. This cow gave in one year, milk, 3,136; test 8.64; butter fat, 133 lbs.

(Courtesy of Hoard's Dairyman).

COST PER HUNDRED POUNDS' GAIN IN PIGS.

Corn at 40 cents per bushel, skim milk at 15 cents per cwt.

Fed on	Cost per 100 lbs.
Corn and bluegrass.....	\$3 92
Corn and rape.....	3 49
Corn and clover.....	3 20
Corn and alfalfa.....	2 96
Corn and skim milk.....	2 84

If, by milking a cow, she may be made to produce \$50.00 a year, or even \$30.00 a year more cash than when she is not milked, there certainly should be more men engaged in the business. Notice that A. M. H., LaGrange, Mo., realized an average of \$75.76 cash per cow per year. These men are they who pay for their groceries at the time of purchase, so that when the corn crop and the hog crop are sold that money may be used for payment on the farm or in the improvement of buildings.

*Big Difference With Same Market.*—But notice what a difference there is between H. R. and C. B., both of Corder, with the same number of cows; C. B. receiving \$101.00 more than his neighbor. Again, this is apparent in the case of A. D. and W. A. of Billings, each with ten cows milking for one year, yet W. A. receiving nearly \$100.00 more than his neighbor. Both these, mind you, sold their produce at the same factory. It is quite apparent that either W. A. has better stock or that he gives better care, for he made a third more during the year than his neighbor, with the same number of cows. Glancing down the column giving income per cow per year, we find a great variation; the yearly income varying all the way from \$33.60 to \$75.76. Though this variation be great, the net income would show a greater difference. It may reasonably be figured that the manure, and the skim milk for the feeding of pigs and calves, pay for the work bestowed on the cow. Assuming that it cost \$35.00 a year to feed a cow, the net loss on the lowest would be \$1.40, while the net profit with the highest would be \$40.76, one cow being over forty times as profitable as the other.

*Select the Cows Within the Herd.*—Only a few years ago it was thought that a pedigree was a guarantee of profit, but not so today. Although the dairy-bred herds have a much higher percentage of profitable individuals, it yet remains that all breeds

have some inferior members. Cows belonging to the "no breed" breed are far more likely to be inferior than their better bred neighbors. Unfortunately, but few records have been kept as yet by the farmers of the State. Notice the following records. These men feed the skim milk to calves and pigs, thus greatly increasing their actual profit:

HERD RECORD OF T. G. HALL, WINDSOR, HENRY CO., MO

No. of cow.	No. of months milking.	Amt. of milk in lbs.	Aver. % of fat.	Lbs. butter food.	Cost of fat.	Profit.	Profit per mo.	Remarks.
1...	10 mos. 24 days.	7,878	4.75	373.2	\$29 15	\$28 02	\$2 60	This cow is a registered Jersey.
2...	9 mos. 8 days.	4,111	5	205.55	About same. above.	7 84	22	This cow was poorly handled last year.
3	8 mos. 20 days.	4,766	5.5	262.13	30 00	17 18	1 98	This is a two-year-old.
4...	4 mos. 20 days.	3,432	6	205.92	12 75	24 31	5 20	This is an Island bred Jersey with her third calf.

Notice that cow number 4 gave more than three times the net profit obtained from number 2, and in half the time.

HERD RECORD OF R. L. HARBAUGH, LIBERTY, CLAY CO., MO.

No. of cow.	No. of months milking.	Amt. of milk in lbs.	Aver. % of fat.	Lbs. fat.	Cost of food.	Profit or loss.	Remarks.
1.....	7½	4,317	.....	To	July	1st.	An old cow. Have no record.
2.....	7	4,855	.....	"	"	"	Sent to the block.
3.....	8	4,826	.....	"	"	"	Still milking.
4.....	6½	3,318	.....	"	"	"	Sold for beef.
5.....	13½	6,144	2 yr.	old cow	first	calf.	Calved June 7, 1905, any milked to July 18, 1906.
6.....	8½	3,559	2 yr.	old cow	first	calf.	
7.....	5½	4,265		To	July	1st.	Freshened in January.
8.....	2½	2,441	"	"	"		
9.....	1½	1,268	"	"	"		

"I do not test each cow, but ship my cream to creamery. Amount butter fat for six months ending on June 30, was 707 pounds, and we churn for our own use besides. R. L. H."

The above record, though not complete, shows that unless No. 6 can offer a very good excuse for having given only 3,559 pounds of milk in 8½ months, she could be disposed of. No. 7, milking only 5 2-3 months, gave considerably more milk.

C. S. Russell, Ironton, Iron County, Mo., says: "I had nine

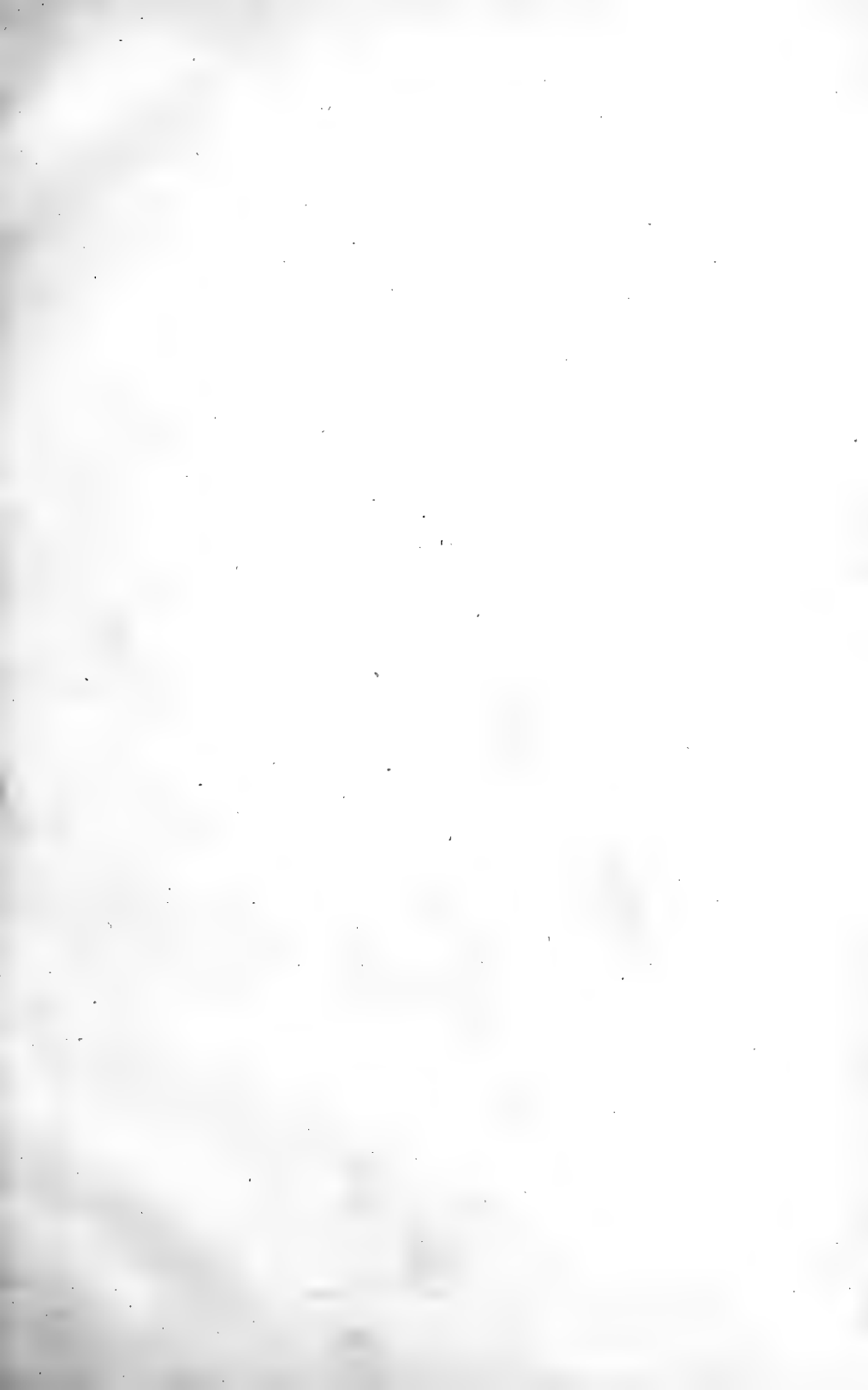




Fig. 9. This cow, DeKol Hengerveld Belle, gave in nine months 11,261 lbs. milk, which contained 456.07 lbs. butter fat, equal to 532 lbs. butter.

(Courtesy of Hoard's Dairyman.)

Jersey cows when I began testing and weighing the milk from each cow separately.

Best cow.....	1 year.	6,050 lbs. milk.	test 4.5	272.25 lbs. butter fat.
Poorest cow.....	1 "	2,700 " "	" 3.6	97.20 " " "

I found only four out of the nine that were worth keeping."

Wesley P. Lummis, Pleasant Hill, Cass Co., Mo., took charge of a herd of well-bred Shorthorn cows and placed every member of the herd on her own merits, and says: "After two years of weighing and testing, giving the cow credit for everything she gave me, and charging her with all I gave her, I found that only *one-third* of the number paid their way."

A. J. McDowell, Fordland, Webster Co., Mo., says "In 1905 I milked 15 cows. Six yielded less than 150 pounds of butter fat each. One only 90 pounds. Seven between 150 pounds and 250 pounds, and two over 300 pounds. I kept four of the best cows and sold eleven, tried to buy some better ones, but failed, and am now breaking in heifers, which I have raised. I cannot tell exactly what it costs me to keep my cows, but I have approximated it, and I think they cost me about \$30.00 a year each, besides the pasture.

#### HERD REPORT FOR 1906.

Name of cow.	Age.	Lbs. of milk.	Test.	Lbs. of butter fat.
Rose.....	2 yrs.	5,670	5.5%	311.85
Mary.....	3 yrs.	5,507	5.6%	308.39
Hattie.....	3 yrs.	5,102	5 %	255.10
Joe.....	Mature cow.	6,792	4.8%	326.01
Inez.....	"	5,889	5.5%	323.89
Jersey.....	"	4,340	6.1%	264.74
Bess.....	"	5,326	5.2%	276.95

I milked several other cows during 1906, but none during the whole year, as I was buying and selling, trying to improve my herd. I have given that up now and am raising a herd from a registered Jersey bull. I think that is the only practical way to get a good herd."

## HERD RECORD OF C. J. W. JONES &amp; SONS, ROANOKE, HOWARD CO., MO.

No. of cow.	No. of months milking.	Amt. of milk. in lbs.	Aver. % of fat.	Lbs. butter fat.	Cost of food.	Profit or loss.	Remarks.
1....	10½	2,490.9	4.3	108.1	*	*	Lost calf and did badly. Never recovered. Record better this year.
2....	11	5,432.2	4.5	344.4			Record this year will be better than last.
3....	12	5,663.1	4.1	295.3			Missed one day's milk in the year.
4....	9	3,002.1	4.0	120.1			No good. Sold to butcher.
5....	9 mos. 20 days.	7,394.3	4.0	295.80			Best cow in herd at present. Grade Shorthorn.
6....	10	4,384.8	5.5	241.16			Grade Jersey. Fair performer.
7....	10 mos. 17 days.	4,597.4	3.5	160.9			Good grade Shorthorn. Second calf.
8....	10 mos. 17 days.	3,809.5	3.6	137.14			Has one-quarter of udder ruined. Cut by wire.
9....	9	3,833.8	4.1	157.2			Her record will be 1000 lbs. better this year.
10....	10	5,951.5	3.1	184.5			Grade Holstein. Bought her and she was milking one month.
11....	10	6,060.8	3.8	230.31			Grade Shorthorn. A good cow with stricture in one quarter.
12....	10	6,086.3	4.5	273.88			Had this cow been trained when young she would be a better cow at least this year.
13....	10	4,863.3	4.3	209.3			A promising heifer. Mother being No. 12 and father an Angus.
14....	9	3,739.1	5.2	184.4			Grade Jersey. Record this year much better than 1905. Mother is No. 6.
15....	10	4,058.0	5.2	210.1			Grade Jersey. Has improved during 1906.
16....	8	4,294.5	4.3	184.66			Angus. Sold for beef. Poorer than last year.
17....	6	2,744.0	3.5	96.04			Angus. Sold for beef.

\*Unfortunately, I have no record for the above two items.

"From experience in my herd I find: First, that the color of the milk does not indicate the richness of the milk, as might be expected; second, the cows that you may pick as your best will often rank low in butter fat and yield in pounds; third, each cow should be tested for richness of butter fat and the milk weighed twice daily during the lactation period; fourth, read all available dairy literature and take the advice of authorities."

Respectfully,

C. J. W. JONES & SONS.



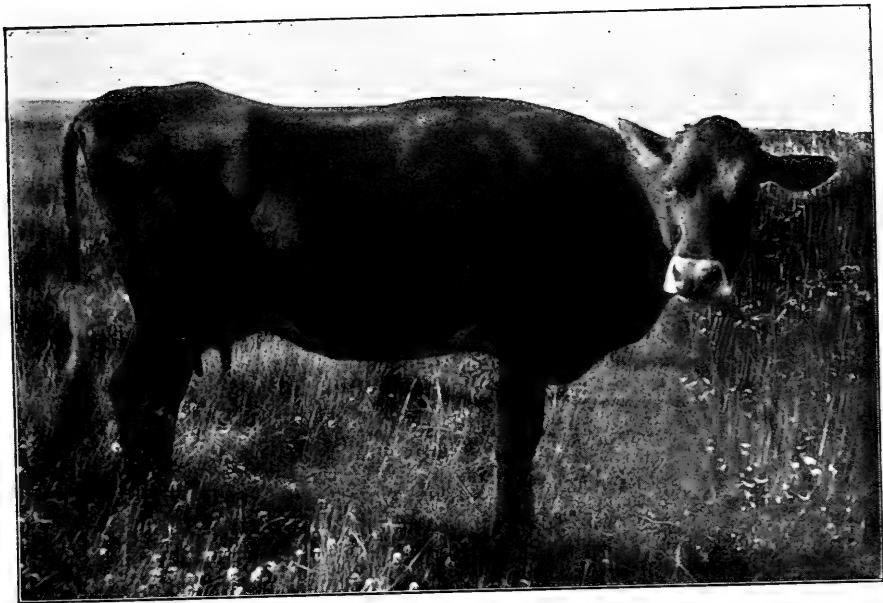


Fig. 10. This cow gave in one year—milk, 2832; test, 4.77; butterfat, 135 lbs., equal to 158 lbs. butter.



Just notice the record made by No. 4. Only 120 pounds butter fat during the same period of time and on the same food as No. 5, who yielded 295 pounds butter fat. Notice also No. 17. Ninety-six pounds butter fat in six months. She certainly was not intended for dairy purposes.

S. W. Coleman, Sedalia, Pettis County, Mo., says: "I have never made a record of any one cow. It has been inconvenient for me to do so, although I expect to at some future date. The only record is on the herd, which is 400 pounds butter to the cow in twelve months."

## HERD RECORD OF P. THEISS, WARRENSBURG, JOHNSON CO., MO.

Name of cow.	No. of months milking.	Amt. of milk given.	Aver. % of fat.	Lbs. butter fat.	Cost of food.	Profit.	Profit per month.	Remarks.
		per day lbs.						
Betty.....	5	36	3½	179	\$11 00	\$24 80	\$4 69	
Bessy.....	5	35	4	210	11 00	31 00	6 20	
Pearly.....	5	34	6	306	11 00	50 20	10 04	
Wite.....	5	30	4	180	11 00	35 00	7 00	First calf.
Boss.....	5	28	4½	189	11 00	36 00	7 20	" "
Susy.....	5	28	4½	189	11 00	36 00	7 20	" "
Kate.....	4	28	5	168	9 00	24 60	6 15	" "
Daisy.....	4	32	6	230	9 00	37 00	9 25	
Topsy.....	10	20	4	240	22 00	26 00	2 60	First calf.
Lilly.....	10	20	5	300	22 00	38 00	3 80	" "
Jersey.....	14	20	6	504	32 00	68 00	4 85	

"From experience in my herd I find that it is the only way of doing business, and that a man don't know what he is doing any other way."

As a whole, the above record is a good one; so also is the conclusion reached by this careful gentleman.

Professor C. H. Eckles, Department Dairy Husbandry, Agricultural College, Columbia, Mo., says regarding the College herd:

Best Jersey.....	Av. 4 years.....	8,065 lbs. milk.....	376 lbs. fat.
Poorest Jersey.....	Av. 5 years.....	3,290 lbs. milk.....	186 lbs. fat.

## Single milking period records of above cows:

Best Jersey.....	1 year.....	10,200 lbs. milk.....	465 lbs. fat.
Poorest Jersey.....	1 year.....	2,443 lbs. milk.....	124 lbs. fat.

Best and poorest records of entire herd above three years of age:

Jersey.....	1 year.....	10,200 lbs. milk. ....	465 lbs. fat.
Jersey.....	1 year.....	2,607 lbs. milk. ....	115 lbs. fat.
Best Holstein.....	1 year.....	12,096 lbs. milk. ....	410 lbs. fat.
Poorest Holstein.....	1 year.....	7,755 lbs. milk. ....	245 lbs. fat.

	Age.	Lbs milk	Lbs. fat.	Cost feed.	Amount profit on butter fat.
No. 21.....	2 years.....	6,750	337	\$35 00	\$52 62.
.....	3 years.....	6,988	364	38 00	56 64.
No. 62.....	2 years.....	878	44	30 00	18 56 loss.
.....	3 years.....	2,607	115	32 00	2 10 Loss.

"No. 21 and No. 62 are both registered Jerseys, raised on the College Farm. They were sired by the same bull, and their mothers were somewhat related. Both were raised under the same conditions and have had the same kind of food and treatment all their lives. During the two milking periods both have received practically the same ration, except No. 21 was given somewhat more on account of her greater appetite. The difference in the production of these two animals can only be attributed to their individuality.

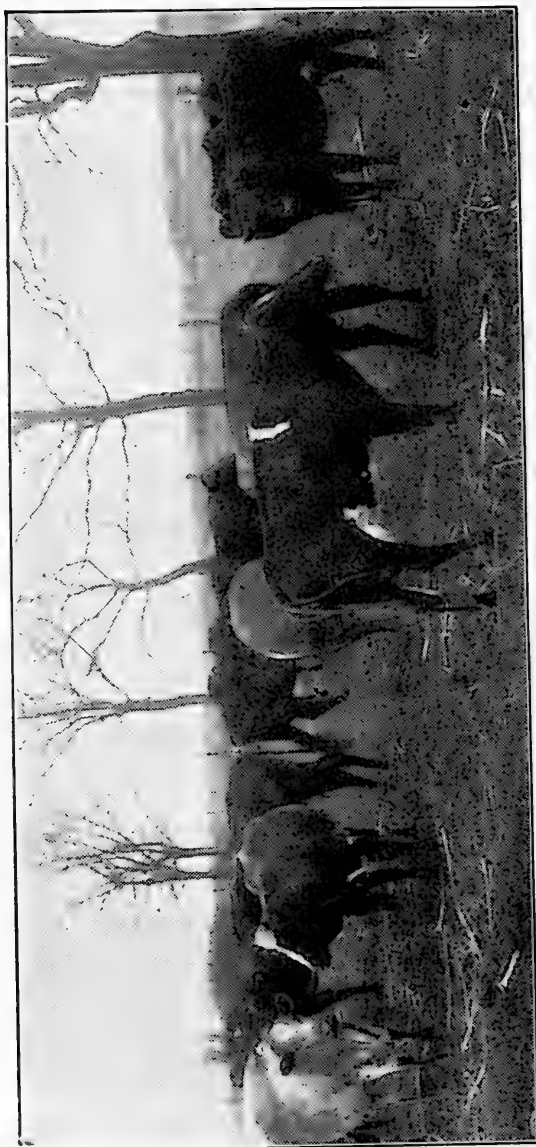
The average production of the cows above two years old in dairy herd in 1906 was 85 lbs. of butter fat more than the average production in 1901. This improvement has been brought about by culling out the inferior animals. About one-third of the herd on hand in 1901 was sold on account of their low production."

#### ILLINOIS, AS REPORTED BY W. J. FRASER.

*Comparison in Milk Production.*—"The cows in the better herd were picked up here and there at moderate prices. They have been producing milk throughout the year at the rate of 18 cans to 45 cows, or  $2\frac{1}{2}$  cows to a can (8 gallons). The latter herd has been yielding at the rate of  $5\frac{1}{3}$  cans to 34 cows, or 6.4 cows to the can.

"When milk sells at \$1.15 per hundred pounds, this means that the average cow in the better herd produces  $29\frac{1}{2}$  cents' worth of milk per day, or \$88.50 worth as the total for a year of ten months. The poorer herd yields  $11\frac{1}{2}$  cents' worth of milk per cow per day,

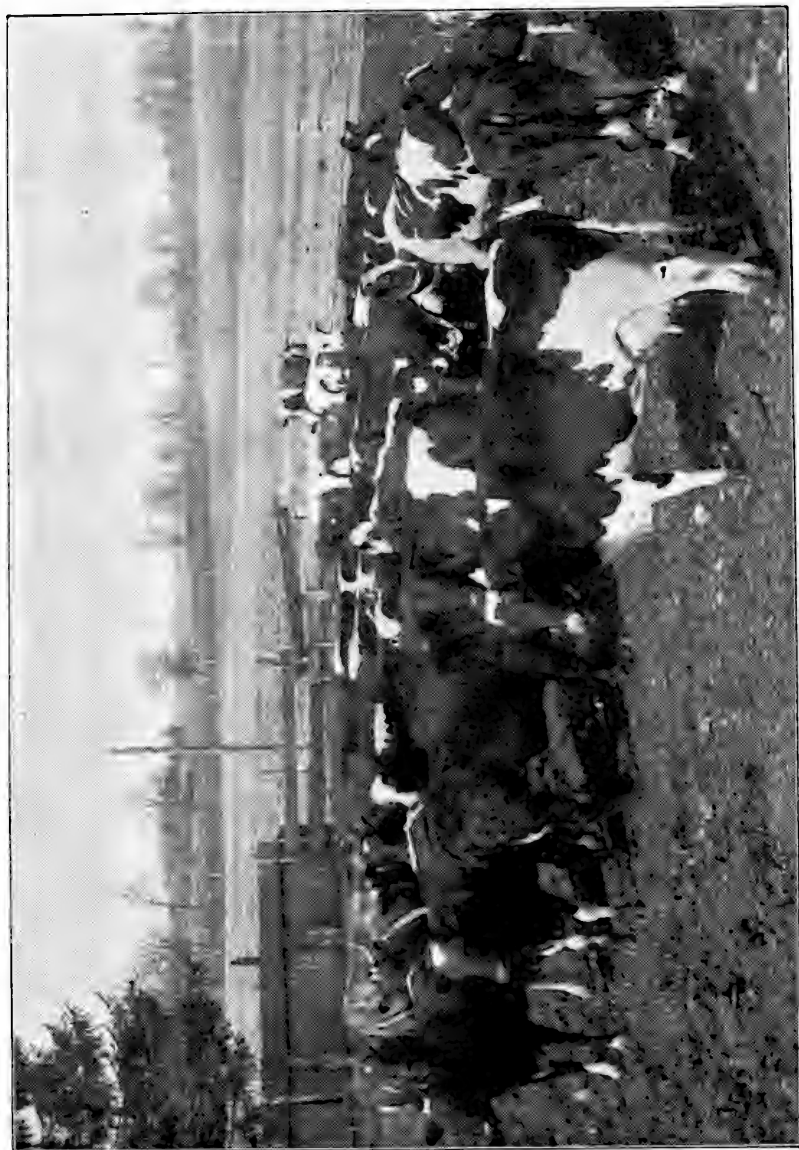




For profit

19 of these cows equals 1 of the other herd.  
 190 of this kind equals 10 of the other herd.  
 380 of this kind equals 20 of the other herd.  
 760 of this kind equals 40 of the other herd.  
 1520 of this kind equals 80 of the other herd.

Fig. 12. (Courtesy of Prof. W. J. Frasier of Illinois.)



For profit

1 of these cows equals 19 of the other herd.  
 10 of this kind equals 190 of the other herd.  
 20 of this kind equals 380 of the other herd.  
 40 of this kind equals 760 of the other herd.  
 80 of this kind equals 1520 of the other herd.

Fig. 13. (Courtesy of Prof. W. J. Frazier of Illinois.)





or \$34.50 worth for the year. There is some difference between these cows and their incomes. (See figs, 12 and 13.)

"If it costs \$32 per cow for feed in the poorer herd, just \$2.50 per head is left as the profit for one year. But if the better herd is fed at \$40 per cow, it leaves \$48.50 per head as a profit. Here is a difference of \$46 in clear gain, or, in other words, it takes 19 cows of the one kind to equal one cow of the other kind. In a herd of 40 cows this difference would amount to \$1,840.

"If a man desired to make \$1,000 per year profit in the dairy business, he would have to keep 400 of these poor producers. But he would get the same results with 21 cows like those in the better herd."

## IOWA.

Comparative records of the cows kept at the Iowa Experiment Station, Ames, Iowa, as reported by Mr. C. H. Eckles, who had charge of the herd during the time this record was made.

BUTTER FIGURED AT 20 CENTS PER POUND AND SKIM MILK AT 20 CENTS PER CWT.

Description of cow.	Lbs. of milk produced per year.	Lbs. butter produced per year.	Cost of feed.	Net profit.
Best Holstein.....	12,111	538	\$29 83	\$97 15
Poorest Holstein.....	6,667	246	21 71	38 16
Difference.....	5,444	292	\$8 12	\$58 99
Best Shorthorn.....	9,869	474	\$27 38	\$83 25
Poorest Shorthorn.....	3,059	129	23 83	6 86
Difference.....	6,837	345	\$3 55	\$76 39
Best Red Pole.....	7,225	361	\$25 32	\$58 44
Poorest Red Pole.....	5,249	236	25 24	30 36
Difference.....	1,976	125	00.08	\$28 08
Best Jersey.....	6,523	532	\$26 26	\$90 58
Poorest Jersey.....	4,087	236	18 54	35 20
Difference.....	2,436	296	\$7 72	\$52 38

Notice the difference between the best and the poorest Holstein, both pure, one making two and one-half times more money in the year than the other. Notice again the extra difference in profitableness of the Shorthorns, the best more than 12 times as profitable as the poorest. The Red Poles offer a very neat condition, there being only eight cents difference in the cost of their

feed for a year, yet there is \$28.08 difference in the net profit obtained. The Jerseys are found to vary in about the same proportion as the Holsteins.

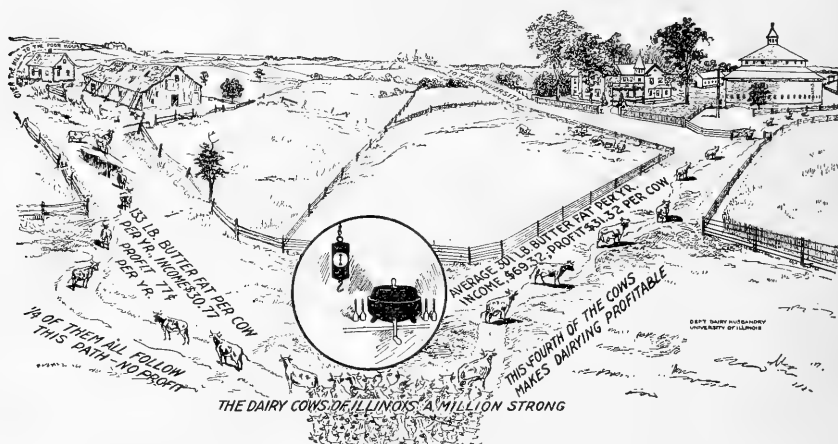


Fig. 14. The whole story in a nutshell.  
(Courtesy Farmers' Tribune.)

#### NEW YORK, CORNELL STATION, AS REPORTED BY H. H. WING.

Records of herd shows that Daisy produced 2,829.75 pounds of milk and made butter fat at cost of 26 cents a pound, while Freddie gave 11,165.00 pounds of milk and made butter fat at 12½ cents per pound. Daisy produced milk at \$1.48 a hundred pounds; Freddie produced milk at 47 cents a hundred pounds during same year on same feed.

#### OHIO, AS REPORTED BY C. G. WILLIAMS.

Record of the Station herd showed that Patti's 5th, during a certain experiment period, gave 2,967.1 pounds of milk, with a profit over feed of \$25.93, while Vanity's 2nd, during same time and on same feed, gave only 819.4 pounds milk, with a profit over feed of \$3.43. Another group, same Station, Nelly's 4th, 2,861.9 pounds of milk, with a profit over feed of \$16.44, while on the same feed and during the same time Fancy's 4th gave but 605.2 pounds milk and was fed at an actual loss of \$1.94. Same Station reports for 1896 Daisy's 2nd gave 168.16 pounds fat, while Ruby, during the same year, gave 521.32 pounds fat. The work bestowed on these two animals was practically the same and the feed cost was not greatly different.



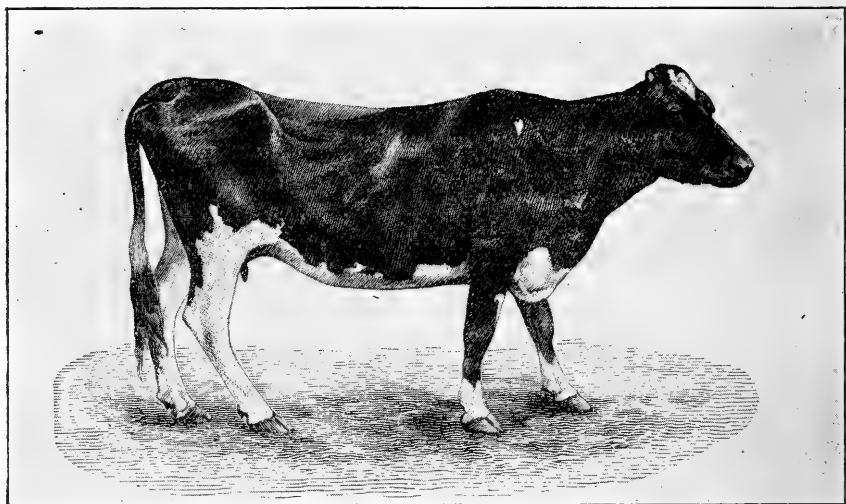


Fig. 15. Cow Bettie, Minnesota Experiment Station. A poor cow. Had not sufficient capacity for taking food.

## ALABAMA, AS REPORTED BY R. W. CLARK.

Susan made 331.7 pounds butter, while Ada was making 168.4; Susan gave net profit of \$58.71, while Ada gave but \$17.85. In the year following Susan made a net profit of \$48.25, while Clemintina was making \$7.46.

## MINNESOTA, AS REPORTED BY T. L. HÆCKER.

In the year 1894 the cow Allie gave a total of 161.35 pounds butter fat, while Huston, on the same feed and the same stable, made 305.46 pounds butter fat. Allie barely paid her board, while Huston made a good profit.

## ILLINOIS, AS REPORTED BY A. J. GLOVER.

Mr. Glover tested many herds over the State for a period of two years, and reports the best cow tested is Pet, herd N, who gave 428 pounds butter, while No. 6, herd A, was giving 158 pounds butter. He adds:

COMPARING THE AVERAGE PERFORMANCE OF TEN OF THE BEST COWS  
AND TEN OF THE POOREST COWS TESTED FOR TWO YEARS.

	Milk, pounds.	Fat, per cent.	Fat, pounds.	Days in milk.
Best cows.....	7,425	4.52	336	329
Poorest cows.....	3,841	3.74	144	262

The average production of the best ten cows was 3,579 pounds more milk and 194 pounds more butter fat per year than the average production of the ten poorest cows. While the average yield of butter fat by the best cows is about two and one-fourth times greater than the yield of butter fat by the poorest, yet the net profit is many times larger. To illustrate: If it takes 150 pounds of butter fat per year to pay for a cow's keeping, a cow that produces 151 pounds of butter fat per year returns to her owner a net profit of one pound of butter fat; if another cow gives 152 pounds of butter fat per year, she returns to her owner a net profit of two pounds of butter fat, or twice as much profit as the cow that produced 151 pounds of butter fat; therefore, the cow that produced 152 pounds of butter fat is twice as profitable a cow as the one that produced 151 pounds of butter fat, because she gives a net profit of two pounds of butter fat instead of one.

Question: How much more profitable are the best ten cows yielding 336 pounds of butter fat per cow per year than the ten poorest yielding only 144 pounds of butter fat per cow per year?

About \$30,000,000 worth of dairy products are annually produced in the State (Illinois). The amount can easily be doubled with the same number of cows if the dairymen will give their business the attention it deserves.

The net profit from the cows of Missouri could easily be doubled in the next ten years.

### MEASURING THE COW'S VALUE.

*Testing Daily Not Necessary*—Although it would be a little more accurate to weigh the cow's milk every morning and every night throughout the year and test it as often as once a week, such a procedure is too expensive to be of practical value on the farm. If the cow's milk be weighed and sampled for three days about the middle of each month, and the milk given by the cow for that month be estimated as ten times the quantity given in these three days, and then the test obtained from the composite sample of three days' accumulation be accepted as the test for the month, the results at the end of the year will be about 96 per cent. perfect. That is as close as the farmer need work.

*Composite Samples*—Pint Mason fruit jars are excellent for preserving these composite samples. Prepare one jar for each cow to be tested, label each jar with the number of the cow, then add to each jar a corrosive sublimate tablet, such as are obtainable from creamery supply houses. The poison in these tablets kills all bac-

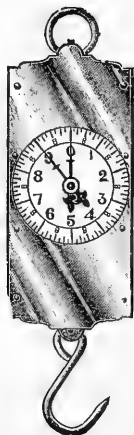


Fig. 17. Spring balance for weighing milk.  
(Courtesy Blanke & Hauk, St. Louis.)

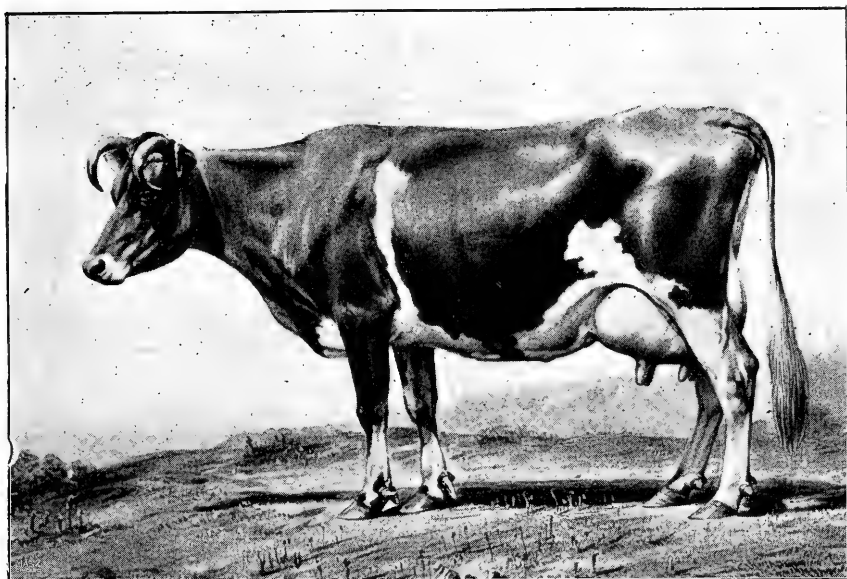


Fig. 16. Imported Comassie, 11,874. A high producing Jersey.





teria in the milk, and thus prevents it from becoming sour. The pink color given to the milk by these tablets is merely for safety. Open jars cannot be used for composite work. So much of the water would evaporate from the milk that the test would be much too high. Arrange a permanent shelf in the cow stable for these sample jars.

*Weighing*—Secure a spring balance like that of Figure 17. Suspend it where the bucket of milk will swing freely, not touching the wall. When the cow has been milked clean (for the last milk is much richer than the first) hang the bucket on the balance, and record the weight immediately onto the permanent milk sheet, similar to that shown on page 78.

Now stir the milk three or four strokes with a dipper, which will hold about two tablespoonfuls, then dip out one measure, and add it to the bottle corresponding in number to the cow just milked. After the milk is added in this way, the sample should be whirled a little to mix the fresh milk with the poison previously placed in the bottle.

These several little steps require such a very small amount of time, when once the tools have been conveniently arranged, that it may be considered as taking no time at all. (The writer has done this sampling, weighing and recording of weight for each cow, and still milked thirteen ordinary cows in 65 minutes, though seventy to seventy-five minutes was the usual length of time.)

The form of milk sheet on page 78 is convenient. It may be copied onto tough paper, or full size sheets may be purchased from any one of several dairy publishing companies. This particular form is gotten up by Hoard's Dairyman, Ft. Atkinson, Wisconsin.

*Permanent Records*—Don't keep the permanent records on scraps of paper nor in pocket-sized books.

A book of 200 pages, each page  $5\frac{1}{2}$  by  $11\frac{1}{2}$  inches, can be purchased for 10 cents or 15 cents. Each page will hold the record of 30 cows for a month. Write the names or numbers of the cows down the left margin of the left-hand page, then rule up the remainder of the page like January (page 79).

Do not rewrite the names onto next page, but rule it for February near left side of page, so that the outer third of the leaf may be cut off, so that when turned it will just fit the names of the cows. Then on this narrow page rule for March, and so on. In this way, one writing of the names will answer for a whole year or longer.



## HERD RECORD FOR JANUARY, 190—.

Name or No. of cow.	Lbs. milk given in 3 days.	Estimate of milk per month.	Test from composite sample.	Lbs. of fat per month.
1.....	60	600	3.5	21.00
2.....	48	480	3.7	17.76
3.....	90	900	3.4	30.60
4.....	21	210	4.6	9.66
5.....	Etc.			
6.....				
7.....				
8.....				
9.....				
10.....				

Sample page in permanent record.

## HOW TO DO THE TESTING.

The testing of milk by the Babcock method is not difficult, either in operation or to learn; neither does it require much time to operate when learned.

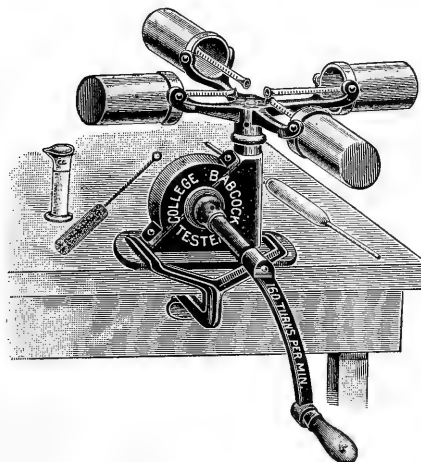


Fig. 18. This is a pretty good little tester, but not one to be recommended.  
(Courtesy Blanke & Hauk, St. Louis.)

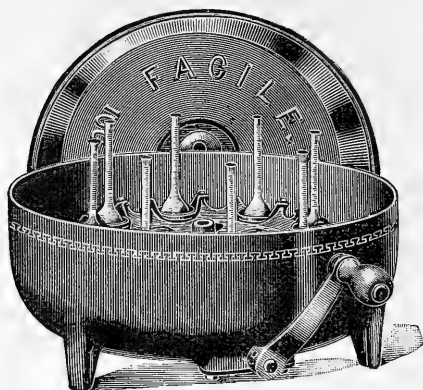


Fig. 19. A good hand tester. Will last many years if reasonably well handled.  
(Courtesy Blanke & Hauk, St. Louis.)

*The Testing Machine*—There are now several makes on the market, all of which are good. A simple machine, like Figure 18, will do the business very well, but is not so desirable as a heavier machine, in which the bottles are all enclosed and free from danger of being struck while in motion. A tester like figure 19 is the most satisfactory now on the market, and can be got at any creamery supply house for \$9.00 or \$10.00. Whatever machine is used, it must be fastened solid to a level stand or table before operating. Where it is to be used at intervals throughout the year, it is very important that it have a corner of its own somewhere, where it will be ready for operation any moment needed. To set it aside when not in use, with the intention of bringing it out and setting it up every time needed, means simply that after one or two months the work will cease. Arrange for convenience at first.

*Glassware*—Buy only good standard glassware, something which is guaranteed to be accurate. Accurate work cannot be done with inaccurate tools. Have a place for the glassware, and keep it there while not in use. More glass tools are broken by being left around carelessly than by the usage.

*To Test Milk*—Let us suppose that we have a sample of milk to be tested. The steps in the operation will be as follows:

First—Thoroughly mix the milk. If the cream clings to the side of the dish, warm it slightly in order that all of the cream may become thoroughly, very thoroughly mixed. This mixing is best done by pouring from one vessel to another and back again. A test bottle brush is also convenient in cleaning cream away from the sides. If there is any tendency on the part of the milk

to foam, pour it down the side of the dish to prevent it. Remember, if there are many small bubbles of air in the milk, and you measure out a certain quantity, the actual quantity obtained is not sufficient, and the test will be low just in proportion.

Second—Now take the pipette, figure 20, and hold it in the manner shown. Place the lower end in the milk and the upper end in the mouth and draw the milk up into the tube nearly to the mouth, then let go with the lips and catch the end of the pipette with the forefinger, as shown in figure 20, then slowly

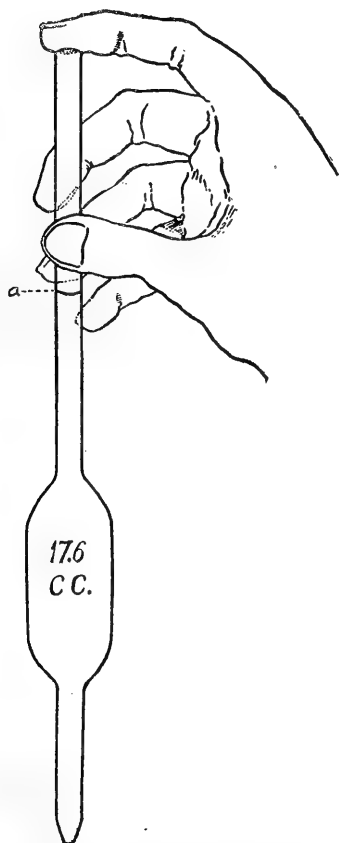


Fig. 20. Pipette for measuring milk into test bottle.



Fig. 21. Milk Test Bottle.

allow the air to enter under the finger, thereby allowing the milk to drop down to the scratch A, then, being careful not to lose any of the milk, slip the point of the pipette into the top of the milk

bottle, figure 21, allow the milk to flow slowly into the bottle. If bubbles of air cause a waste of any of the milk, empty the bottle, and try again. Always remember in testing that the sample taken is an exceedingly small part of the entire quantity, for which the reading of the sample is to give value.

Third—Now take the acid measuring glass, figure 22, fill it with sulphuric acid to the scratch, which is usually about three-fourths of the way up. The acid is merely a tool. A few drops too much or too little will do no harm. Now hold the test bottle containing the milk, figure 21, in the left hand and at an angle of about 45 degrees, then carefully pour the acid from the acid measure into the sample of milk, allowing it to run slowly down the side of the bottle, gliding gently under the milk. If the bottle be held upright, or if the acid be poured in too quickly, a burnt and unreliable test is likely to be caused. Now gently whirl the sample, giving the bottle a circular and at the same time up and down motion, in order to mix the contents of the bottle without shaking any out of the top, which always remains open. When the contents have been sufficiently mixed by whirling, it should be a uniform dark brick-red color. At this point the bottle will be extremely hot, making it necessary to handle by the neck.

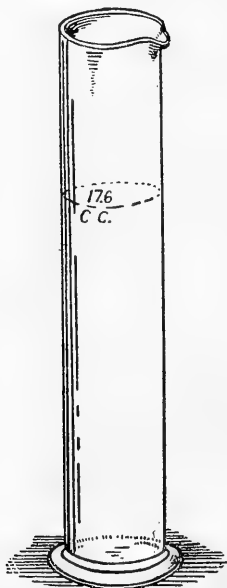


Fig. 22. Acid Measure.

Fourth—Now place the sample in one of the pockets of the testing machine, and place a similar one exactly opposite. The

machine must *always* be made to *balance*. In case there is only one sample to be tested, a bottle of water may be used for a balance.

Fifth—Start the machine slowly, gradually increasing the speed until the test bottles are whirling at a rate of 1,000 to 1,200 revolutions per minute. (By counting the number of revolutions made by the pockets for each turn of the crank it can be easily calculated how many turns of the crank will be necessary to achieve the required speed.) Turn steadily for five minutes, then *gently* stop the machine, and with the pipette carefully, in order that no bottle be run over, add clean, soft hot water into the test bottle until the water and fat rise two-thirds of the way up the neck of the bottle, then close the lid, and whirl as before for a period of two minutes. Now the test is made, and simply requires reading.

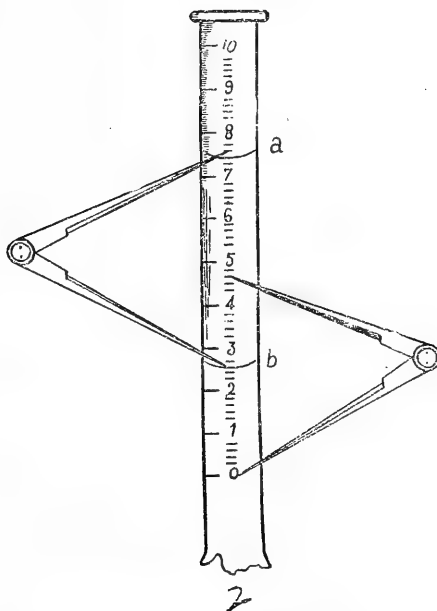


Fig. 23. Showing how to read the test. Spread the dividers from the extreme bottom to the extreme top of the fat, then place the lower point at 0 and read the number at the top point. 4.6 fat in this case.

Sixth—With a sample compass or dividers measure the fat in the neck of the test bottle, as shown in figure 23. The points of the compass should extend from the very bottom to the very top of the fat, as shown in the cut. Read the fat while hot, or if it gets cool warm it up to about 130 or 135 Fahr. before reading. Do not count out anything for the little cup or maniscus on the top of the fat. Being careful not to change the spread of the

compass, place one point at zero and read the figure indicated. A quantity of fat which would extend from zero to one, or from one to two, would be one per cent. A quantity of fat which would make a column extending from zero to four would be four per cent. Notice the fine divisions on the test bottle. There being five marks for each per cent., all divisions between, then, must indicate two-tenths of a per cent. For illustration, suppose the milk tested 4.6 per cent. (as in figure 23), this means simply that there are 4.6 pounds of fat in 100 pounds of this milk. Example: How many pounds of butter fat are there in 473 pounds of milk, which tests 4.6 per cent? This will read, 473 times .046 equals 21.758. There are then 21.758 pounds of butter fat in that quantity of milk. Example: How many pounds of butter fat in 237 pounds of milk testing 3.5 per cent? This reads, 237 times .035 equals 8.295. There are then 8.295 pounds of butter fat in 237 pounds of milk testing  $3\frac{1}{2}$  per cent. Example: How many pounds of butter fat in 193 pounds of milk which tests 3.8 per cent?

*Skim Milk*—First—Make sure that the bottles and pipette are thoroughly clean. If the pipette has been used in testing whole

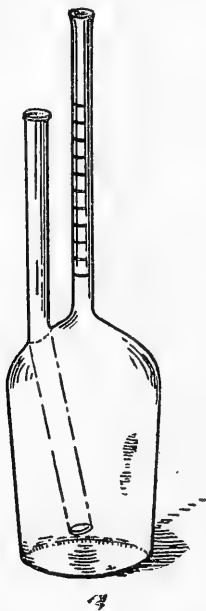


Fig. 24. Skim milk test bottle.

milk or cream it must be well washed before sampling skim milk. The mixing of the sample and the process of adding it to the test bottle, figure 24, are the same as described for whole milk.



Before endeavoring to run the milk down the larger tube of the bottle make sure that there are no drops of water in the slender tube. If there are, the milk will very likely bubble out of the wide-mouth tube, making it necessary to clean the bottle and try again.

Second—The process of whirling, adding hot water and whirling again, are the same as described for whole milk. The same quantity of milk and acid as in former case.

Third—When the second run has been completed, the fat should be read while still hot. The portion of the neck of the bottle, figure 24, between one scratch and another is equal to .05 per cent. A quantity of fat which would extend from the bottom mark to the top would equal half a per cent. A good hand separator will leave in the skim milk about enough fat to fill one space in the neck of this bottle. If, in testing the skim milk, it is found that two spaces are filled with fat, it indicates poor machine or poor handling.

*Cream*—Although in testing cream the thing accomplished is the same as that accomplished in the testing of milk, the mode of getting the result is somewhat different. Cream is a substance which varies in its richness all the way from 10 per cent. to

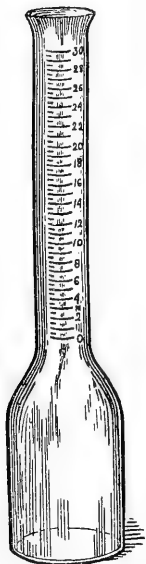


Fig. 25. Cream test bottle.

60 per cent. fat. Fat is lighter than the milk; therefore, the more fat there is in the cream the lighter that cream is. The whole Babcock test is based on the understanding that 18 grams of the sample be taken. While testing whole milk and skim milk the

sample taken may be measured, because they are so nearly constant in weight. The pipette for milk, which holds 17.6 cubic centimeters up to the scratch, holds 18 grams of milk or skim milk, but would not hold 18 grams of cream, and the richer the cream the farther below 18 grams. The sample of cream to be tested, must then be weighed. The process is as follows:

First—Place the cream bottle, figure 25, on one pan of the scales, figure 26, and balance the bottle by sliding those brass balls forward or back. When the balance is perfect, set the 9 gram weight on the opposite pan, then with the pipette drop cream, which has previously been thoroughly mixed, into the test bottle until the balance is again perfect, even down to the drop of cream.

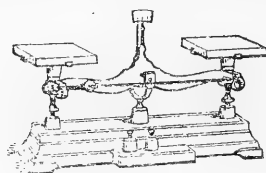


Fig. 26. Cream Scale.

Second—Now add about half a tablespoonful of clean, soft water to the cream in the bottle.

Third—Now add the sulphuric acid, using about three-fourths of a measure.

Fourth—Thoroughly mix the acid and cream by the whirling motion as described for milk.

Fifth—Place test bottles in machine, balance and whirl five minutes, then add hot water nearly to top of neck, and whirl two minutes.

Sixth—With the same compass shown in figure 23 read the column of fat in cream. Now suppose the column of fat extended over  $13\frac{1}{2}$  spaces, the test of that cream would be 27 per cent. Remember 9 grams only, not 18, of cream were taken. With half the required quantity of cream the result obtained must be doubled. If the cream column extended 22 spaces the true reading would be 44 per cent. Example: How many pounds of fat in 78 pounds of cream which tests 36 per cent? Seventy-eight times .36 equals 28.08. We have then 28.08 pounds of fat in 78 pounds of cream testing 36 per cent. Example: How many pounds of fat in 59 pounds of cream testing 32 per cent? Fifty-nine times .32 equals 18.88. We have then 18.88 pounds of fat in 59 pounds of cream testing 32 per cent. Example: How many pounds of fat in 11 pounds of cream testing 45 per cent?

*Cleaning the Glassware*—Just as soon as the test is made and the fat read, empty the test bottle, for then, by shaking a little, the ash or lime in the bottom of the bottle will rinse out easily. The hot liquid will also wash out most of the fat.

*Caution*—Do not dump this where any animal can walk in it, neither put it in a metal or wooden dish. The acid is very strong. Don't let acid get on clothes; it will ruin them in a few minutes.

Wash the glassware in hot water, best with some sal soda or strong soap in it. Rinse in clean water, and turn in a rack to drain and to wait for next time of using.

### ERRORS TO AVOID IN TESTING CREAM.

It is not an especially difficult task to test cream, but must be understood, or errors will be made by those of the best intentions. The following are the chief causes of inaccuracy:

- 1st. Gross sample not a true one, because
  - (a) Cream sour and clotted.
  - (b) Cream dried on surface.
  - (c) Cream partly churned.
  - (d) Cream good, but not well mixed before sampling.
- 2nd. Test bottle sample not correct, because
  - (a) Cream measured instead of weighed. (18 grams required.)
  - (b) Cream weighed with inaccurate scales. (Keep all bearings free from rust and gum.)
  - (c) Of slovenly work in weighing.
- 3rd. Acid mistakes—
  - (a) Too much or too strong acid (burns fat).
  - (b) Too little or too weak acid (leaves white curd under the fat).
  - (c) Acid too warm (burns fat; 60 to 65 degrees F. works best).
  - (d) Acid poured through cream (burns in clots).
  - (e) Acid not well mixed when shaking is commenced (burns in clots).
- 4th. Mistakes in whirling—
  - (a) Speed too slow (12-inch tester requires 1,200 revolutions; 24-inch tester requires 800 revolutions).
  - (b) Not turned long enough (5 to 6 minutes necessary).
  - (c) Bottles too cool while turning (fat cannot rise; should be 140 degrees F. for cream and 200 F. for skim milk).

## 5th. Mistakes in adding water—

- (a) Water too cold (150 to 200 degrees F. right).
- (b) Water dirty (causes gray cloud below fat).
- (c) Water hard (the lime in hard water often causes unreliable results; use rainwater or condensed steam).

## 6th. Mistakes in reading fat—

- (a) Reading too hot (fat expanded; 120 to 140 degrees F. right).
- (b) Reading too cold (fat contracted, not volume enough).
- (c) Upper surface of fat not leveled (a few drops of amyl alcohol on top of fat makes a flat surface of the concave one. This applies to cream only.)

## 7th. Inaccurate graduation of test bottles—

- (a) Every bottle should be tested.

When so small a quantity of cream has to represent so large a quantity it is exceedingly important that every step in the process be performed with the utmost care.

## VARIATIONS IN TESTS OF CREAM.

“Why do different lots of cream from the same separator vary so much in per cent. of fat?” This is a very common question asked at Farmers’ Institutes all over the State. There are several causes for this variation.

## 1. Speed of the separator—

The faster the bowl turns the richer the cream, slower the thinner. Sometimes the man does the turning, then again a weaker person, the woman or a child, has the work to do. Sometimes the one turning feels lazy, and at other times is physically excited. Time the machine with the watch.

## 2. Rate of inflow of the milk—

The faster the milk goes in, the thinner the cream. If the milk hopper is kept full all the time, the extra pressure carries the milk through faster than when it is low in the can. If machine runs empty a few times during the separation, the cream will be richer.

## 3. Per cent of fat in the milk—

A richer milk gives a richer cream. The milk of a whole herd of cows may vary as much as a half of a per cent. between morning and night. The heat and excitement of the day tends to increase the per cent. of fat present. Any unusual excitement may cause a similar temporary rise in fat.

#### 4. Temperature of the milk when separated—

Any decrease in the size of the hole, out of which the cream is delivered from the bowl, will increase the per cent. of the fat in the cream. Cold cream sometimes thus clogs the passage and causes a richer cream to be delivered.

#### 5. Acidity of the milk—

A half-sour milk may cause a thin cream. If night's milk is left to be separated in the morning in the summer, it very often sours to that extent that when separated the fine clots and fibres of curd cling to the outer wall of the bowl and clog the exit of the skim milk, thus forcing some of it into the cream spout, and in consequence a thin cream is secured.

#### 6. Adjustment of cream screw—

This may have jarred or been turned by some one without the knowledge of the one complaining.

#### 7. Cream will rise on cream—

And if the top be poured off to make butter for the home, the portion sold is thinner than the average. This is occasionally done knowingly by the farmer to test the man who tests the cream.

#### 8. Hand skimmed cream is very variable—

Thick from pans and crocks, and thin from deep cans. It is almost next to impossible to so skim that the same amount of skim milk will be put into the cream vessel each time. The best test for a market cream is thirty-five to forty-five per cent.

The man who does public testing must know his business, and then have enough confidence in himself and enough natural sand to stand by his figures, no matter what they read.

### MORE BUTTER THAN BUTTER FAT.

Another frequent query is regarding the amount of butter a given amount of cream will make. The test gotten at the creamery is for butter fat, not for butter. Butter is not all fat. It contains from 10 to 15 per cent. water, from 2 to 3 per cent. salt and from 1 to 2 per cent. casein, or cheesy matter. In general, 6 pounds of fat will make 7 pounds of butter, but whether it does that or not will depend on

#### 1. Acidity of cream when churned—

If cream is not sour enough, fat may be lost in the buttermilk, and thus lessen the overrun.

#### 2. Temperature of cream when churned—

If too warm, the amount of fat lost in the buttermilk will be great, and the yield lowered.

## 3. Amount the butter is worked—

If worked much the water may be worked out and the butter left dry, or with only 10 per cent. of water, while less working or working in water may leave a wet butter, or one containing as high as 20 per cent. water.

## 4. Size of churn and amount of cream—

If the churn is too large for the amount of cream, considerable cream may be lost by sticking to axis of the churn. This is especially liable to occur with thick cream in small quantities.

## 5. Accuracy of the scales—

On small amounts of butter the degree of accuracy of the scales used may introduce an apparent discrepancy.

## THE ADULTERATION OF MILK AND ITS DETECTION.\*

*Composition of Milk*—Before entering into a discussion of the adulteration of an article, it is necessary that the normal composition of that article be first understood. Milk is a complex fluid, made up of several very dissimilar substances. Its composition varies according to the breed of the animal. Some breeds of cows give milk much richer in fat and somewhat richer in other solids than others. Not only is there a difference between breeds, but the milk from different individuals of the same breed will vary considerably, and a cow giving milk which tests 4 per cent. fat, when she is fresh, will usually give milk testing  $4\frac{1}{2}$  per cent. to 4.8 per cent. toward the end of her lactation period. When cows are nearly dry their milk is richer in all solids, especially in fat, than it is when they are fresh. Dry feed also has a tendency to produce a slightly richer milk.

*Milk Solids*—When milk is evaporated to dryness the water is evaporated, and the milk solids are obtained. Milk solids are a mechanical mixture of fat, casein, albumen, milk, sugar and ash. Normal milk contains about 13 per cent. of solid matter and 87 per cent. water. Some samples contain as low as 12 per cent. solids, with 88 per cent. water; others as high as 14 per cent. solids, with 86 per cent. water.

*Milk Fats*—Average milk contains about  $3\frac{1}{2}$  per cent. of fat. Some normal samples may contain 3 per cent. or less, while others may contain 6 per cent. or more. The fat in milk is not present in solution, but in suspension in the form of minute globules. These milk fat globules are about  $\frac{1}{5,000}$  of an inch in diameter.

(\*In preparing the following pages on adulteration free use has been made of "Dairy Chemistry" by H. Snyder.)

A single drop of milk contains from one hundred million to one hundred and fifty million fat globules. The size of the fat globules varies, first, with the breed and individuality of the animal, and second, according to the length of time the animal has been in milk. When a cow is fresh there is a smaller number of globules, but the globules are larger. When the cow is well along in her milking period the globules are smaller, but more numerous. The fat is lighter than any other constituent of the milk.

*Casein*—Average milk contains about 3 per cent. of casein, which in fresh milk is practically in a soluble condition, but in sour milk is precipitated as curd. The per cent. of casein in milk is quite constant, ranging from 2.8 to 3.5. As a general rule normal milk contains less casein than fat.

*Albumen*—Average milk contains about one-half a per cent. of albumen, which is nearly identical with egg albumen, or the white of the egg. When fresh milk is boiled the "scum" which forms on the surface is albumen. The amount of albumen in milk is quite constant, and ranges from one-half to three-fourths of a per cent.

*Milk Sugar*—Lactose, or milk sugar, is present in milk to the extent of about 5 per cent. When obtained in the pure state it resembles in appearance confectionary sugar, but not in taste. Milk sugar takes an important part in butter and cheese-making, as it is the material from which the acid is formed when milk sours. The amount of milk sugar or lactose in milk is quite constant, ranging from 4.6 to 5.4 per cent. In average milk it is the constituent which is present in largest amount of any of the milk solids.

*Ash*—When the milk solids are burned there is a small amount of greyish, white ash obtained. The ash content of milk is constant and varies but little from three-fourths of one per cent. The white substance, which settles at the bottom of the Babcock test bottles when testing, is ash.

AVERAGE MILK HAS ABOUT THE FOLLOWING COMPOSITION.

	Ave. percent.	Range per cent.
Water.....	87.00	82.4 to 89.6
Fat.....	3.50	2.5 to 6.0
Milk sugar.....	5.00	4.3 to 6.0
Casein.....	3.25	2.5 to 4.0
Albumen.....	0.50	0.5 to 0.8
Ash.....	0.75	0.6 to 0.8

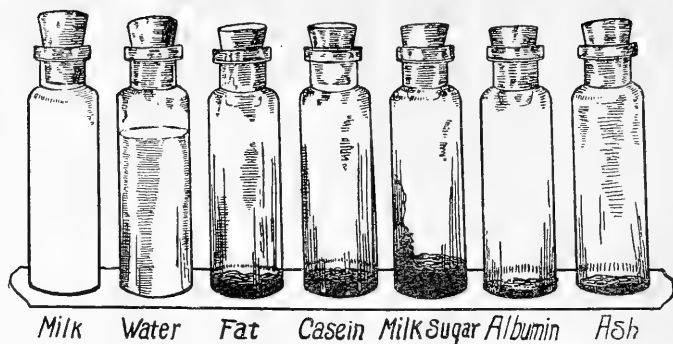


Fig. 27. Showing composition of milk.

It is seldom that the extreme limits as given above are met with. See figure 27 for comparative composition of average milk.

#### FORE-MILK VS. STRIPPINGS.

The fore-milk, or that obtained with the first stream or two taken from the cow, is usually very poor in butter fat. The last few streams are rich in fat. The writer has tested this point with different cows, and has found that in some cases the strippings tested as high as seventeen times richer than the first, although usually the difference is only about three to four times. Thus the necessity for thorough milking of the cow before taking a sample to test.

#### THE SPECIFIC GRAVITY OF MILK.

If a can holds 100 pounds of water, to fill it with milk would require about 103.2 pounds. This is because milk has a greater specific gravity than water. By a specific gravity of a material, is meant the weight of a given volume compared with the weight of an equal volume of water under the same conditions. Milk has a higher specific gravity than water, because it contains in solution a number of substances, as sugar, ash, casein and albumen, which increase the weight of an equal volume of milk, causing it to have a higher specific gravity. The fat of milk, on the other hand, which is lighter than water, has a tendency to lower the specific gravity. Since the variations in the fat content of milk range between three and six per cent., it follows that the variations in the gravity of milk are due largely to the variations in the fat content. Since the milk fats vary between known limits, the specific gravity of normal milk varies between definite limits. The lowest specific gravity of normal milk is 1.029, while the highest



specific gravity is 1.034. The richer a sample of milk in casein, milk sugar and ash, the greater its buoyant power and the higher specific gravity, which results in the lactometer stem not sinking to so great a depth as it would if less casein, sugar and ash were present. Hence, we find skim milk having a greater specific gravity than normal milk. On the other hand, the addition of water to milk lowers the specific gravity below 1.029, almost proportionally with the amount of water added. Milks very rich in fat have a lower specific gravity than milks which contain less fat. This is due to the additional fat in the milk lowering its specific gravity. A skilled operator can readily determine whether the increase or decrease in the specific gravity of milk is due to variation in the water or in the fat content of the milk.

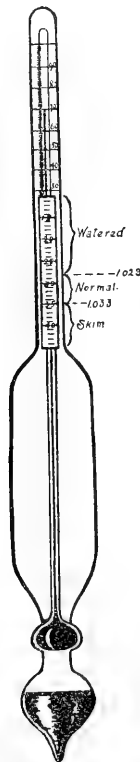


Fig. 28. The Lactometer.

#### QUEVENNE'S LACTOMETER.

The lactometer is a piece of apparatus for determining the specific gravity of milk. It consists of a bulb (see Fig. 28.) weighted with mercury, attached to a glass tube of cylindrical

form provided with a graduated stem, which enables the operator to determine the depth to which the instrument sinks in milk. Numbers registered on the lactometer scale range from 15 to 40. These are called the lactometer degrees. If the lactometer sinks to a depth of 31 on the scale, it means that the milk has a specific gravity of 1.031. In normal milk the lactometer shows a specific gravity of 1.029 to 1.034. Between each of the numbered divisions, as 25 to 30, there are five subdivisions, which enable the operator to read to a .001 on the specific gravity scale, or less, if care is taken in the observations.

There are other forms of lactometers in use, but the Quevenne's is generally preferred because of its greater accuracy. A lactometer should always be provided with a thermometer, in order that the necessary corrections for temperature of the lactometer readings may be made.

#### INFLUENCE OF TEMPERATURE.

Whenever a lactometer reading is made, the temperature of the milk should also be recorded, because a variation of 10 degrees in temperature affects the lactometer reading to the extent of 1 degree. When the milk is cold, it is contracted in volume, and the lactometer does not sink to as great a depth as if the milk were warm. This results in the lactometer recording a high specific gravity. On the other hand, if the milk is too warm, it is expanded, which has the effect of diluting the milk, causing the lactometer to sink to a greater depth and a lower specific gravity to be secured. In making corrections for temperature, the following general rule can be applied: When the temperature is greater than 60° F., add .1 of a lactometer degree for each degree of temperature, and when less than 60° F., subtract .1 for each lactometer degree. This general rule will apply only for a variation of 10 degrees either above or below the temperature of 60°.

#### INFLUENCE OF SKIMMING AND WATERING.

Since milk has a specific gravity varying from 1.029 to 1.034, it follows, as previously stated, that any addition of water necessarily lowers the specific gravity, and any removal of the fats necessarily raises the specific gravity. When skimming alone or watering has been practiced, it is easily detected by means of the lactometer; but when milk is both skimmed and watered, the lactometer results fail to reveal the fact. The water lowers the gravity, and the re-

removal of the fat raises it, so that milk that has been both skimmed and watered, may have the same gravity as normal milk. This double fraud, however, is easily detected when the Babcock test is used jointly with the lactometer.

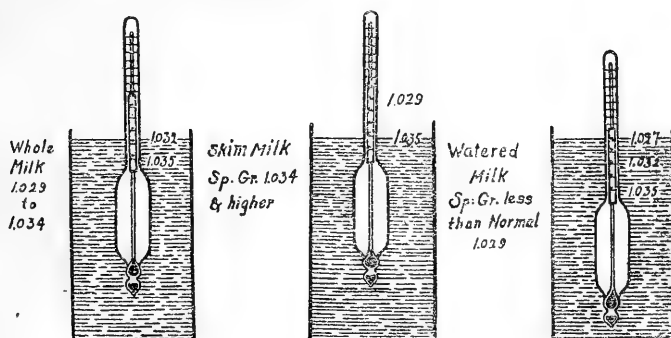


Fig. 29. Showing position of lactometer in normal, skimmed and watered milk.

#### JOINT USE OF LACTOMETER AND BABCOCK TEST.

When used jointly, the quality of the milk, and the extent to which any adulteration may have been practiced, can be accurately determined. The following general rule will aid in determining the quality of milk: A low fat and a high specific gravity indicate skimming or removal of fats. A low fat and a low specific gravity indicate the addition of water. A low fat and a normal specific gravity indicate that milk has been both skimmed and watered. While, if there is a normal fat and a normal gravity, it safe to conclude that the milk has been neither skimmed nor watered.

#### IF THE ANALYSIS OF SUSPECTED SAMPLE SHOW

Specific Gravity of milk low

watered

Fat low

Specific Gravity of milk high

skimmed

Fat low

Specific Gravity of milk normal

skimmed  
and

Fat low

watered.

Any one, after a little experimenting on his own account, can soon learn to detect the common adulterations of milk.

### PRESERVATIVES.

When milk or cream handled in the ordinary way around town and left warm does not become sour in 36 hours some preserving agent has almost certainly been used. There is no preservative yet known which will keep the milk sweet without injuring it as food. Milk is a delicate food, intended for the delicate stomach of an infant, and the continued use of small quantities of preservatives may, and doubtless does, often mean the slow killing of the child consuming that milk. When milk is produced from healthy cows and in a cleanly manner and kept cool, there will be no need for chemical preservatives. The slovenly and indifferent man is the one who makes use of preservatives to cover up his poor work. The dairyman who makes a practice of adding chemical preservatives to milk intended for consumption in homes may not be a murderer, but he is by the very act, acknowledging that he is willing to take chances on becoming one.

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## PART III.

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(Conditions over which this office had little control have prevented this report going to press as promptly as had been intended. Two bills were passed by the Forty-fourth General Assembly [which] will be of interest in this volume. Senate Bill No. 47, which was approved by the Governor on the 15th of March, gives to Missouri a comprehensive pure food law. Senate Bill No. 48, by converting the office of Dairy Commissioner into that of Dairy and Food Commissioner, with additional power, provides the necessary machinery for making the pure food law effective. This bill was approved by the Governor on the 22nd of March. Both these laws go into effect June 14, 1907.)

[S. B. 47.]

## CRIMES AND PUNISHMENTS: ADULTERATION OF FOODS AND DRUGS.

AN ACT to prohibit the manufacture and sale of foods, drugs, medicines, beverages and liquors, as defined in this act, which are adulterated or misbranded within the meaning of this act; and prescribing penalties for violations thereof.

### SECTION

1. Prohibiting sale of adulterated foods or drugs.
2. Term "drug" defined.
3. When drug deemed adulterated.
4. When food deemed adulterated.
5. Term "misbranded" defined.
6. When drug deemed misbranded.
7. When food deemed misbranded.

### SECTION

8. Statement of ingredients on label.
9. False label deemed misbrand.
10. Removing or altering label.
11. Sample for analysis, when furnished.
12. Dealer, not to be prosecuted, when.
13. Act, how construed.
14. Penalty.
15. Repealing other acts.

*Be it enacted by the General Assembly of the State of Missouri, as follows:*

SECTION 1. No person or persons, firm or association of persons, company or corporation shall, within this state, manufacture, produce, sell, offer or expose for sale, or have in his, their or its possession, with intent to sell, any article of food or drug which is adulterated or misbranded within the meaning of this act, or cause or procure the same to be done by others.

SEC. 2. The term "drug," as used in this act, shall include all medicines and preparations recognized in the United States Pharmacopœia or National Formulary for internal or external use, and any substance or mixture of substances intended to be used for the cure, mitigation or prevention of disease in man or animals. The term "food," as used in this act, shall include all articles used for food, drink, confectionery or condiment by man or animal, whether simple, mixed or compound.

SEC. 3. A drug shall be deemed to be adulterated within the meaning of this act: 1. If, when sold under or by a name recog-

nized in the latest revised edition of the United States Pharmacopœia or National Formulary, it differs from the standard of strength, quality or purity prescribed therein. 2. If its strength, quality or purity fall below the professed standard under which it is sold: Provided, that no drug defined in the United States Pharmacopœia or National Formulary shall be deemed to be adulterated under this provision if the standard of strength, quality or purity be plainly stated upon the bottle, box or other container thereof, although the standard may differ from that determined by the test laid down in the United States Pharmacopœia or National Formulary.

SEC. 4. Food shall be deemed to be adulterated: 1. If any substance or substances have been mixed with it so as to lower or depreciate or injuriously affect its strength, quality or purity. 2. If any substance or substances have been substituted wholly or in part for the article. 3. If any valuable or necessary constituent or ingredient has been wholly or in part abstracted from it. 4. If it is mixed, colored, coated, polished, powdered or stained in a manner whereby damage or inferiority is concealed; or if, by any means, it is made to appear to be better or of greater value than it really is. 5. If it contain any added substance which is poisonous or injurious to health: Provided, that when in the preparation of food products for shipment they are preserved by any external application, applied in such a manner that the preservative is necessarily removed mechanically or by maceration in water or otherwise, and directions for the removal of said preservative shall be printed on the covering of the package, the provisions of this act shall be construed as applying only when said products are ready for consumption. 6. If it consist wholly, or in part, of a deceased, filthy, decomposed, putrid, infected, tainted or rotten animal or vegetable substance, or any part or portion of an animal diseased or otherwise unfit for food, whether manufactured or not, or if it is the product of a diseased animal, or of an animal that has died otherwise than by slaughter, and in case of meats, oysters or fish, sold or offered for sale in the fresh state, if such meats, oysters or fish shall have been inoculated, dusted, powdered, sprayed, rubbed, annointed, washed, sprinkled, fumigated, or in any other manner treated with any of the substances declared deleterious or dangerous by this act, or any antiseptic or chemical preservative or dye stuff whatsoever, whose use and apparent purpose is to mask decomposition, or to give to the meat, oysters or fish a false appearance of freshness or quality. And in the case of dairy pro-



ducts, if any such product be drawn or produced from cows fed on unhealthy or unwholesome food, or on waste, slops, refuse, leavings or residue of any nature or kind from distilleries, breweries or vinegar factories, or on food in a state of putrefaction, or from cows diseased in any way. 7. If it contains methyl or wood alcohol in any of its forms. 8. If it be an imitation or sold as or for another article. 9. If, in the case of confectionery, it contains terra alba, barytes, arsenic, talc, chrome yellow or other mineral substances, a poisonous color or flavor, or other ingredients deleterious or detrimental to health, or vinous, malt or spirituous liquor or narcotic drug; or 10. If it does not conform to the standard of strength, quality and purity now or hereafter to be established by the United States department of agriculture.

SEC. 5. The term "misbranded," as used in this act, shall apply to all drugs and articles of food, or articles which enter into the composition of drugs or food, the package or label of which shall bear any statement, design or device regarding such article or the ingredients or substances contained therein which shall be false or misleading in any particular, and to any food or drug product which is falsely branded as to state, territory or country, in which it is made, manufactured, produced or grown, or as to the person, firm or corporation by whom it is made, manufactured, produced or grown.

SEC. 6. In the case of drugs an article shall also be deemed to be misbranded: 1. If it be an imitation of, or offered for sale under the name of, another article. 2. If the contents of the package, as originally put up, shall have been removed in whole, or in part, and other contents shall have been placed in such package. 3. If the package fail to bear a statement on the label of the quantity or proportion of any alcohol, morphine, opium, heroin, cocaine, eucaine (alpha or beta), chloroform, cannabis indica, chloral hydrate, acetanilid, or any derivative or preparation of any such substance contained therein: Provided, that subdivision 3 of this section shall not apply to any drug prepared or sold on the prescription of a duly licensed physician, or prepared by a duly licensed pharmacist for immediate sale upon an order therefor.

SEC. 7. In the case of food, as herein defined, an article shall also be deemed to be misbranded: 1. If it is an imitation of, or is offered for sale under the distinctive name of another article. 2. If it be labeled or branded, tagged, stenciled or marked so as to deceive the purchaser, or purport to be a foreign product when

not so. 3. If the contents of the package, as originally put up, shall have been removed in whole, or in part, and other contents shall have been placed in such package. 4. If it fail to bear a statement on the label of the quantity or proportion of any morphine, opium, heroin, cocaine, eucaine (alpha or beta), chloroform, cannabis indica, chloral hydrate, acetanilid, or any derivative or preparation of any such substances contained therein. 5. If, in package form, and the contents are stated in terms of weight and measure, they are not plainly and correctly stated on the outside of the package. 6. If the package containing it, or its label, shall bear any statement, design or device regarding the ingredients or the substances contained therein, which statement, device or design shall be false or misleading in any particular: Provided, that an article of food which does not contain any added poisonous or deleterious ingredients shall not be deemed misbranded in the following cases, viz.: (1) In the case of mixtures or compounds which may now, or from time to time hereafter, be known as articles of food under their own distinctive names and not an imitation of or offered for sale under the distinctive name of another article, if the name be accompanied on the same label or brand with a statement of the factory or place where said article has been manufactured or produced; (2) in the case of articles labeled, branded, stenciled or tagged so as to plainly indicate that they are mixtures, compounds, imitations or blends, and the word "mixture;" "compound," "imitation," or "blend," as the case may be, is plainly stated on the package or container in which they are offered for sale: Provided, that the term "blend" as used herein shall be construed to be a mixture of like substances; not excluding harmless coloring and flavoring ingredients used for the purpose of coloring and flavoring only, and, provided further, that nothing in this act shall be construed as requiring or compelling manufacturers of proprietary foods, which contain no unwholesome ingredient, or substance added to increase the bulk or weight of the finished product, to disclose their trade formulas, except in so far as the provisions of this act may require, to secure freedom from adulteration or misbranding.

SEC. 8. If a statement of any of the ingredients of an article of food or drink, or of an article entering into food or drink, is required by law to be stated upon the label or package of such article, or is stated upon the label of such article, whether required by law or not, such statement and the name and address of the manufacturer or vendor of the article shall be distinctly and con-

spicuously printed on the label or package in straight parallel lines of plain, uncondensed legible type, well spaced, on a plain ground. The statement of ingredients shall be clearly separated from and not interspaced or confused with other matter, shall specify each and every ingredient by its ordinary name and shall be in the English language. The letters of said type shall be as large as any printed matter on the label or package (except the name of the compound, or chief article named therein which may be in larger type), and shall not be smaller than 8-point Gothic caps: Provided, that in case the size of the package does not allow the use of type of such size, then the size may, with the approval of the dairy and food commissioner, be proportionately reduced. The required label shall be firmly attached to or printed on the exterior of the package or envelope of the said article, on the top or side thereof, and in plain sight; but the dairy and food commissioner may, in writing, approve specific labels not strictly in accordance with the above provisions if it is his opinion that the information is set forth thereon clearly enough for the reasonable protection of the purchaser.

SEC. 9. Drugs or foods labeled in violation of the provisions of sections 5, 6, 7 and 8 shall be deemed to be misbranded within the meaning of this act.

SEC. 10. No person, firm, association of persons or corporation shall deface, erase or remove any label or mark provided for in this act with intent to mislead, deceive, or violate any of the provisions of this act, nor cause the same to be done by others.

SEC. 11. Every person, firm, association of persons or corporation manufacturing, offering or exposing for sale, or delivering to a purchaser, any drug or article of food included in the provisions of this act, upon application of any person or an inspector, analyst or other officer or agent of the state, and tender to such person, firm, association or corporation of the value thereof, shall furnish a sample for analysis of any such drug or article of food which is so in his or their possession.

SEC. 12. No dealer shall be prosecuted under the provisions of this act when he can establish a guaranty, as provided for in the national food and drug act approved June 30, 1906, or a guaranty, signed by the wholesaler, jobber, manufacturer or other party, residing in the state of Missouri, or who shall have filed in the office of the dairy and food commissioner a designation of the name and residence of some competent person being and continuing a resident of this state, process served on whom shall be valid and [ac-]

ceptable as personally served upon such party in any suit or proceeding under this act, from whom he purchased such articles, to the effect that the same are not adulterated or misbranded in the original unbroken packages, within the meaning of this act. Said guaranty, to afford protection, shall contain the name and address of the party or parties making the sale of such articles to such dealer, and in such case said party or parties shall be amenable to the prosecutions, fines and other penalties which would attach, in due course, to the dealer under the provisions of this act.

SEC. 13. When construing and enforcing the provisions of this act, the act, omission or failure of any officer, agent or other person acting for or employed by any person, corporation, firm or association, within the scope of his employment or office, shall, in every case, be deemed to also be the act, omission or failure of such employer.

SEC. 14. Any person, firm, association or corporation who shall, within this state, manufacture or produce, offer or expose for sale, or shall sell or deliver, or have in his or their possession with intent to sell, any drug or food, as defined in this act, which is adulterated or misbranded within the meaning of this act, or who shall fail or refuse, upon the application of a proper person, and the tender to him of the value thereof, to deliver to such person a sample, sufficient for analysis, of any drug or article of food in his or their possession, as required by this act, or who shall violate any of the provisions of this act, shall be guilty of a misdemeanor, and upon conviction thereof, be punished for every such offense by a fine not less than ten dollars nor more than five hundred dollars, or by imprisonment in the county jail not to exceed six months, or both such fine and imprisonment, and shall, in addition, be adjudged to pay all costs and expenses incurred in inspecting and analyzing such food or drug. All fines recovered under the provisions of this act shall be paid to the state treasurer.

SEC. 15. All acts and parts of acts inconsistent with this act are hereby repealed.

Approved March 15, 1907.

(The following are the standards of purity for food products, established by the United States Department of Agriculture to which reference is made in subdivision 10 of section 4 of senate bill 47.)

## PRINCIPALS ON WHICH THE STANDARDS ARE BASED.

The general considerations which have guided the committee in preparing the standards for food products are the following:

1. The standards are expressed in the form of definitions, with or without accompanying specifications of limit in composition.

2. The main classes of food articles are defined before the subordinate classes are considered.

3. The definitions are so framed as to exclude from the articles defined substances not included in the definitions.

4. The definitions include, where possible, those qualities which make the articles described wholesome for human food.

5. A term defined in any of the several schedules has the same meaning wherever else it is used in this report.

6. The names of food products herein defined usually agree with existing American trade or manufacturing usage; but where such usage is not clearly established or where trade names confuse two or more articles for which specific designations are desirable, preference is given to one of the several trade names applied.

7. Standards are based upon data representing materials produced under American conditions and manufactured by American processes or representing such varieties of foreign articles as are chiefly imported for American use.

8. The standards fixed are such that a departure of the articles to which they apply, above the maximum or below the minimum limit prescribed, is evidence that such articles are of inferior or abnormal quality.

9. The limits fixed as standard are not necessarily the extremes authentically recorded for the article in question, because such extremes are commonly due to abnormal conditions of production and are usually accompanied by marks of inferiority or abnormality readily perceived by the producer or manufacturer.

## FOOD STANDARDS.

### I. ANIMAL PRODUCTS.

#### A. MEATS AND THE PRINCIPAL MEAT PRODUCTS.

##### a. MEATS.

1. *Meat, flesh*, is any clean, sound, dressed, and properly prepared edible part of animals in good health at the time of slaughter, and if it bears a name descriptive of its kind, composition, or origin, it corresponds thereto. The term "animals," as herein used, includes not only mammals, but fish, fowl, crustaceans, mollusks, and all other animals used as food.

2. *Fresh meat* is meat from animals recently slaughtered and properly cooled until delivered to the consumer.

3. *Cold storage meat* is meat from animals recently slaughtered and preserved by refrigeration until delivered to the consumer. *a*

4. *Salted, pickled and smoked meats* are unmixed meats preserved by salt, sugar, vinegar, spices or smoke, singly or in combination, whether in bulk or in suitable containers. *b*

##### b. MANUFACTURED MEATS.

1. *Manufactured meats* are meats not included in paragraphs 2, 3 and 4, whether simple or mixed, whole or comminuted, in bulk or in suitable containers, *b* with or without the addition of salt, sugar, vinegar, spices, smoke, oils or rendered fat. If they bear names descriptive of kind, composition or origin, they correspond thereto, and when bearing such descriptive names, if force or flavoring meats are used, the kind and quantity thereof are made known.

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*a* The establishment of proper periods of time for cold storage is reserved for future consideration when the investigations on this subject, authorized by Congress, are completed.

*b* Suitable containers for keeping moist food products such as sirups, honey, condensed milk, soups, meat extracts, meats, manufactured meats, and undried fruits and vegetables, and wrappers in contact with food products, contain on their surfaces, in contact with the food product, no lead, antimony, arsenic, zinc or copper or any compounds thereof or any other poisonous or injurious substance. If the containers are made of tin plate they are outside-soldered and the plate in no place contains less than one hundred and thirteen (113) milligrams of tin on a piece five (5) centimeters square or one and eight-tenths (1.8) grains on a piece two (2) inches square. The inner coating of the containers is free from pin holes, blisters, and cracks.

If the tin plate is lacquered, the lacquer completely covers the tinned surface within the container and yields to the contents of the container no lead, antimony, arsenic, zinc or copper or any compounds thereof, or any other poisonous or injurious substance.

## C. MEAT EXTRACTS, MEAT PEPTONES, ETC.

(Schedule in preparation.)

## D. LARD.

1. *Lard* is the rendered fresh fat from hogs in good health at the time of slaughter, is clean, free from rancidity, and contains, necessarily incorporated in the process of rendering, not more than one (1) per cent of substances, other than fatty acids and fat.

2. *Leaf lard* is lard rendered at moderately high temperatures from the internal fat of the abdomen of the hog, excluding that adherent to the intestines, and has an iodine number not greater than sixty (60).

3. *Neutral lard* is lard rendered at low temperatures.

## B. MILK AND ITS PRODUCTS,

## A. MILKS.

1. *Milk* is the fresh, clean, lacteal secretion obtained by the complete milking of one or more healthy cows, properly fed and kept, excluding that obtained within fifteen days before and ten days after calving, and contains not less than eight and one-half (8.5) per cent. of solids not fat, and not less than three and one-quarter (3.25) per cent of milk fat.

2. *Blended milk* is milk modified in its composition so as to have a definite and stated percentage of one or more of its constituents.

3. *Skim milk* is milk from which a part or all of the cream has been removed and contains not less than nine and one-quarter (9.25) per cent. of milk solids.

4. *Pasteurized milk* is milk that has been heated below the boiling but sufficiently to kill most of the active organisms present and immediately cooled to 50° Fahr. or lower.

5. *Sterilized milk* is milk that has been heated at the temperature of boiling water or higher for a length of time sufficient to kill all organisms present.

6. *Condensed milk, evaporated milk*, is milk from which a considerable portion of water has been evaporated and contains not less than twenty-eight (28) per cent of milk solids, of which not less than twenty-seven and five-tenths (27.5) per cent is milk fat.

7. *Sweetened condensed milk* is milk from which a considerable portion of water has been evaporated and to which sugar (sucrose) has been added, and contains not less than twenty-eight (28) per cent of milk solids, of which not less than twenty-seven and five-tenths (27.5) per cent. is milk fat.

8. *Condensed skim milk* is skim milk from which a considerable portion of water has been evaporated.

9. *Buttermilk* is the product that remains when butter is removed from milk or cream in the process of churning.

10. *Goat's milk, ewe's milk, et cetera*, are the fresh, clean, lacteal secretions, free from colostrum, obtained by the complete milking of healthy animals other than cows, properly fed and kept, and conform in name to the species of animal from which they are obtained.

#### b. CREAM.

2. *Cream* is that portion of milk, rich in milk fat, which rises to the surface of milk on standing, or is separated from it by centrifugal force, is fresh and clean and contains not less than (18) per cent of milk fat.

2. *Evaporated cream, clotted cream*, is cream from which a considerable portion of water has been evaporated.

#### c. MILK FAT OR BUTTER FAT.

1. *Milk fat, butter fat*, is the fat of milk and has a Reichert-Meissl number not less than twenty-four (24) and a specific gravity of not less than  $0.905 \frac{40^{\circ} \text{ C.}}{40^{\circ} \text{ C.}}$ .

#### d. BUTTER.

1. *Butter* is the clean, non-rancid product made by gathering in any manner the fat of fresh or ripened milk or cream into a mass, which also contains a small portion of the other milk constituents, with or without salt, and contains not less than eighty-two and five-tenths (82.5) per cent of milk fat. By acts of Congress, approved August 2, 1886, and May 9, 1902, butter may also contain added coloring matter.

2. *Renovated butter, process butter*, is the product made by melting butter and reworking, without the addition or use of chemicals or any substances except milk, cream or salt, and contains not more than sixteen (16) per cent of water, and at least eighty-two and five-tenths (82.5) per cent. of milk fat.



## e. CHEESE.

1. *Cheese* is the sound, solid and ripened product made from milk or cream by coagulating the casein thereof with rennet or lactic acid, with or without the addition of ripening ferments and seasoning, and contains, in the water-free substance, not less than fifty (50) per cent of milk fat. By act of Congress, approved June 6, 1896, cheese may also contain added coloring matter.

2. *Skim milk cheese* is the sound, solid and ripened product, made from skim milk by coagulating the casein thereof with rennet or lactic acid, with or without the addition of ripening ferments and seasoning.

3. *Goat's milk cheese, ewe's milk cheese, et cetera*, are the sound, ripened products made from the milks of the animals specified, by coagulating the casein thereof with rennet or lactic acid, with or without the addition of ripening ferments and seasoning.

## f. ICE CREAMS.

1. *Ice cream* is a frozen product made from cream and sugar, with or without a natural flavoring, and contains not less than fourteen (14) per cent of milk fat.

2. *Fruit ice cream* is a frozen product made from cream, sugar and sound, clean, mature fruits, and contains not less than twelve (12) per cent of milk fat.

3. *Nut ice cream* is a frozen product made from cream, sugar and sound, nonrancid nuts, and contains not less than twelve (12) per cent of milk fat.

## g. MISCELLANEOUS MILK PRODUCTS.

1. *Whey* is the product remaining after the removal of fat and casein from milk in the process of cheese-making.

2. *Kumiss* is the product made by the alcoholic fermentation of mare's or cow's milk.

## II. VEGETABLE PRODUCTS.

## A. GRAIN PRODUCTS.

## a. GRAINS AND MEALS.

1. *Grain* is the fully matured, clean, sound, air-dry seed of wheat, maize, rice, oats, rye, buckwheat, barley, sorghum, millet or spelt.

2. *Meal* is the clean sound product made by grinding grain.

3. *Flour* is the fine, clean, sound product made by bolting wheat meal and contains not more than thirteen and one-half (13.5) per cent of moisture, not less than one and twenty-five hundredths (1.25) per cent. of nitrogen not more than one (1) per cent. of ash, and not more than fifty hundredths (0.50) per cent of fiber.

4. *Graham flour* is unbolted wheat meal.

5. *Gluten flour* is the clean, sound product made from flour by the removal of starch, and contains not less than five and six-tenths (5.6) per cent of nitrogen and not more than ten (10) per cent of moisture.

6. *Maize meal, corn meal, Indian corn meal*, is meal made from sound maize grain and contains not more than fourteen (14) per cent of moisture, not less than one and twelve-hundredths (1.12) per cent of nitrogen, and not more than one and six-tenths (1.6) per cent of ash.

7. *Rice* is the hulled, or hulled and polished grain of *Oryza sativa*.

8. *Oatmeal* is meal made from hulled oats and contains not more than twelve (12) per cent of moisture, not more than one and five-tenths (1.5) per cent. of crude fiber, not less than two and twenty-four hundredths (2.24) per cent. of nitrogen, and not more than two and two-tenths (2.2) per cent. of ash.

9. *Rye flour* is the fine, clean, sound product made by bolting rye meal and contains not more than thirteen and one-half (13.5) per cent. of moisture, not less than one and thirty-six hundredths (1.36) per cent. of nitrogen, and not more than one and twenty-five hundredths (1.25) per cent. of ash.

10. *Buckwheat flour* is bolted buckwheat and contains not more than twelve (12) per cent. of moisture, not less than one and twenty-eight hundredths (1.28) per cent. of nitrogen, and not more than one and seventy-five hundredths (1.75) per cent. of ash.

## B. FRUIT AND VEGETABLES.

### a. FRUIT AND FRUIT PRODUCTS.

(Except fruit juices, fresh, sweet, and fermented, and vinegars.)

1. *Fruits* are the clean, sound, edible, fleshy fructifications of plants, distinguished by their sweet, acid, and ethereal flavors.

2. *Dried fruit* is the clean, sound product made by drying mature, properly prepared, fresh fruit in such a way as to take

up no harmful substance, and conforms in name to the fruit used in its preparation; *sun-dried fruit* is dried fruit made by drying without the use of artificial means; *evaporated fruit* is dried fruit made by drying with the use of artificial means.

3. *Evaporated apples* are evaporated fruit made from peeled and cored apples, and contain not more than twenty-seven (27) per cent. of moisture, determined by the usual commercial method of drying for four (4) hours at the temperature of boiling water.

(Standards for other dried fruits are in preparation.)

4. *Canned fruit* is the sound product made by sterilizing clean, sound, properly matured and prepared fresh fruit, by heating, with or without sugar (sucrose) and spices, and keeping in suitable, clean, hermetically sealed containers, and conforms in name to the fruit used in its preparation.

5. *Preserve b* is the sound product made from clean, sound, properly matured and prepared fresh fruit and sugar (sucrose) sirup, with or without spices or vinegar, and conforms in name to that of the fruit used, and in its preparation not less than forty-five (45) pounds of fruit are used to each fifty-five (55) pounds of sugar.

6. *Honey preserve b* is preserve in which honey is used in place of sugar (sucrose) sirup.

7. *Glucose preserve b* is preserve in which a glucose product is used in place of sugar (sucrose) syrup.

8. *Jam, marmalade, b* is the sound product made from clean, sound, properly matured and prepared fresh fruit and sugar (sucrose), with or without spices or vinegar, by boiling to a pulpy or semi-solid consistence, and conforms in name to the fruit used, and in its preparation not less than forty-five (45) pounds of fruit are used to each fifty-five (55) pounds of sugar.

9. *Glucose jam, glucose marmalade, b* is jam in which a glucose product is used in place of sugar (sucrose).

10. *Fruit butter a* is the sound product made from fruit juice and clean, sound, properly matured and prepared fruit, evaporated to a semi-solid mass of homogeneous consistence, with or without the addition of sugar and spices or vinegar, and conforms in name to the fruit used in its preparation.

11. *Glucose fruit butter a* is fruit butter in which a glucose product is used in place of sugar (sucrose).

12. *Jelly a* is the sound, semi-solid, gelatinous product made

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<sup>a</sup> The subject of sulphurous acid in dried fruits is reserved for consideration in connection with the schedule "Preservatives and Coloring Matters."

<sup>b</sup> Products made with mixtures of sugar, glucose, and honey, or any two thereof, are reserved for future consideration.

by boiling clean, sound, properly matured and prepared fresh fruit with water, concentrating the expressed and strained juice, to which sugar (sucrose) is added, and conforms in name to the fruit used in its preparation.

13. *Glucose jelly* <sup>a</sup> is jelly in which a glucose product is used in place of sugar (sucrose).

#### b. VEGETABLES AND VEGETABLE PRODUCTS.

1. *Vegetables* are the succulent, clean, sound, edible parts of herbaceous plants used for culinary purposes.

2. *Dried vegetables* are the clean, sound products made by drying properly matured and prepared vegetables in such a way as to take up no harmful substance, and conform in name to the vegetables used in their preparation; *sun-dried vegetables* are dried vegetables made by drying without the use of artificial means; *evaporated vegetables* are dried vegetables made by drying with the use of artificial means.

3. *Canned vegetables* are sound, properly matured and prepared fresh vegetables, with or without salt, sterilized by heat, with or without previous cooking in vessels, from which they take up no metallic substance, kept in suitable, clean, hermetically sealed containers, are sound, and conform in name to the vegetables used in their preparation.

4. *Pickles* are clean, sound, immature cucumbers, properly prepared, without taking up any metallic compound other than salt, and preserved in any kind of vinegar, with or without spices; *pickled onions*, *pickled beets*, *pickled beans*, and other pickled vegetables are vegetables prepared as described above, and conform in name to the vegetables used.

5. *Salt pickles* are clean, sound, immature cucumbers, preserved in a solution of common salt, with or without spices.

6. *Sweet pickles* are pickled cucumbers or other vegetables in the preparation of which sugar (sucrose) is used.

7. *Sauerkraut* is clean, sound, properly prepared cabbage, mixed with salt, and subjected to fermentation.

8. *Catchup* (*ketchup*, *catsup*) is the clean, sound product made from the properly prepared pulp of clean, sound, fresh, ripe tomatoes, with spices and with or without sugar and vinegar; *mushroom catchup*, *walnut catchup*, *et cetera*, are catchups made as above described, and conform in name to the substances used in their preparation.

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<sup>a</sup> Products made with mixtures of sugar, glucose, and honey, or any two thereof, are reserved for future consideration.

## C. SUGARS AND RELATED SUBSTANCES.

## a. SUGAR AND SUGAR PRODUCTS.

## SUGARS.

1. *Sugar* is the product chemically known as sucrose (saccharose), chiefly obtained from sugar cane, sugar beets, sorghum, maple and palm.

2. *Granulated, loaf, cut, milled and powdered sugars* are different forms of sugar and contain at least ninety-nine and five-tenths per cent. of sucrose.

3. *Maple sugar* is the solid product resulting from the evaporation of maple sap, and contains, in the water-free substance, not less than sixty-five one-hundredths (0.65) per cent. of maple sugar ash.

4. *Masseccuite, melada, mush sugar and concrete* are products made by evaporating the purified juice of a sugar-producing plant, or a solution of sugar, to a solid or semi-solid consistence, and in which the sugar chiefly exists in a crystalline state.

## MOLASSES AND REFINERS' SIRUP.

1. *Molasses* is the product left after separating the sugar from masseccuite, melada, mush sugar, or concrete, and contains not more than twenty-five (25) per cent. of water and not more than five (5) per cent. of ash.

2. *Refiners' sirup, treacle*, is the residual liquid product obtained in the process of refining raw sugars and contains not more than twenty-five (25) per cent. of water and not more than eight (8) per cent. of ash.

## SIRUPS.

1. *Sirup* is the sound product made by purifying and evaporating the juice of a sugar-producing plant without removing any of the sugar.

2. *Sugar-cane sirup* is sirup made by the evaporation of the juice of the sugar-cane, or by the solution of sugar-cane concrete, and contains not more than thirty (30) per cent. of water and not more than two and five-tenths (2.5) per cent. of ash.

3. *Sorghum sirup* is sirup made by the evaporation of sorghum juice, or by the solution of sorghum concrete, and contains not more than thirty (30) per cent. of water and not more than two and five-tenths (2.5) per cent. of ash.

4. *Maple sirup* is sirup made by the evaporation of maple sap, or by the solution of maple concrete, and contains not more than thirty-two (32) per cent. of water and not less than forty-five hundredths (0.45) per cent. of maple sirup ash.

5. *Sugar sirup* is the product made by dissolving sugar to the consistence of a sirup, and contains not more than thirty-five (35) per cent. of water.

#### b. GLUCOSE PRODUCTS.

1. *Starch sugar* is the solid product made by hydrolyzing starch or a starch-containing substance until the greater part of the starch is converted into dextrose. Starch sugar appears in commerce in two forms, anhydrous starch sugar and hydrous starch sugar. The former, crystallized without water of crystallization, contains not less than ninety-five (95) per cent of dextrose and not more than eight-tenths (0.8) per cent. of ash. The latter, crystallized with water of crystallization, is of two varieties—70 sugar, also known as brewers' sugar, contains not less than seventy (70) per cent. of dextrose and not more than eight-tenths (0.8) per cent. of ash; 80 sugar, climax or acme sugar, contains not less than eighty (80) per cent. of dextrose and not more than one and one-half (1.5) per cent. of ash.

The ash of all these products consists almost entirely of chlorids and sulphates.

2. *Glucose, mixing glucose, confectioner's glucose*, is a thick, sirupy, colorless product made by incompletely hydrolyzing starch, or a starch-containing substance, and decolorizing and evaporating the product. It varies in density from forty-one (41) to forty-five (45) degrees Baume at a temperature of 100° Fahr. (37.7° C.), and conforms in density, within these limits, to the degree Baume it is claimed to show, and for a density of forty-one (41) degrees Baume contains not more than twenty-one (21) per cent., and for a density of forty-five (45) degrees not more than fourteen (14) per cent. of water. It contains on a basis of forty-one (41) degrees Baume not more than one (1) per cent. of ash, consisting chiefly of chlorids and sulphates.

#### c. CANDY.

1. *Candy* is a product made from a saccharine substance or substances with or without the addition of harmless coloring, flavoring or filling materials and contains no terra alba, barytes, talc, chrome yellow, or other mineral substances, or poisonous

colors or flavors, or other ingredients deleterious or detrimental to health, or any vinous malt or spirituous liquor or compound, or narcotic drug.

#### d. HONEY.

1. *Honey* is the nectar and saccharine exudations of plants gathered, modified, and stored in the comb by honey bees (*Apis mellifica* and *A. dorsata*); is lævo-rotatory, contains not more than twenty-five hundredths (0.25) per cent. of ash, and not more than eight (8) per cent. of sucrose.

2. *Comb honey* is honey contained in the cells of the comb.

3. *Extracted honey* is honey which has been separated from the uncrushed comb by centrifugal force or gravity.

4. *Strained honey* is honey removed from the crushed comb by straining or other means.

### D. CONDIMENTS (EXCEPT VINEGAR AND SALT).

#### a. SPICES.

1. *Spices* are aromatic vegetable substances used for the seasoning of food and from which no portion of any volatile oil or other flavoring principle has been removed and which are clean, sound and true to name.

2. *Allspice, pimento*, is the dried fruit of the *Pimenta pimenta* (L.) Kars., and contains not less than eight (8) per cent. of quercitannic acid *a*; not more than six (6) per cent. of total ash, not more than five-tenths (0.5) per cent. of ash insoluble in hydrochloric acid, and not more than twenty-five (25) per cent. of crude fiber.

3. *Anise* is the fruit of the *Pimpinella anisum* L.

4. *Bay leaf* is the dried leaf of *Laurus nobilis* L.

5. *Capers* are the flower buds of *Capparis spinosa* L.

6. *Caraway* is the fruit of *Carum carvi* L.

#### CAYENNE AND RED PEPPER.

7. *Red pepper* is the red, dried, ripe fruit of any species of *Capsicum*.

8. *Cayenne pepper, cayenne*, is the dried, ripe fruit of *Capsicum frutescens* L., *Capsicum baccatum* L., or some other small-fruited species of *Capsicum*, and contains not less than fifteen (15) per cent. of nonvolatile ether extract; not more than six

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*a* Calculated from the total oxygen absorbed by the aqueous extract.

and five-tenths (6.5) per cent. of total ash; not more than five-tenths (0.5) per cent. of ash insoluble in hydrochloric acid; not more than one and five-tenths (1.5) per cent. of starch, and not more than twenty-eight (28) per cent. of crude fiber.

9. *Paprika* is the dried, ripe fruit of *Capsicum annuum* L., or some other large-fruited species of *Capsicum*, excluding seeds and stems.

10. *Celery seed* is the dried fruit of *Apium graveolens* L.

11. *Cinnamon* is the dried bark of any species of the genus *Cinnamomum*, from which the outer layers may or may not have been removed.

12. *True cinnamon* is the dried inner bark of *Cinnamomum zeylanicum* Breyne.

13. *Cassia* is the dried bark of various species of *Cinnamomum zeylanicum*, from which the outer layers may or may not have been removed.

14. *Cassia buds* are the dried immature fruit of species of *Cinnamomum*.

15. *Ground cinnamon, ground cassia*, is a powder consisting of cinnamon, cassia, cassia buds, or a mixture of these spices, and contains not more than six (6) per cent. of total ash and not more than two (2) per cent. of sand.

16. *Cloves* are the dried flower buds of *Caryophyllus aromaticus* L., which contain not more than five (5) per cent. of clove stems; not less than ten (10) per cent. of volatile ether extract; not less than twelve (12) per cent. of quercitannic acid  $\alpha$ ; not more than eight (8) per cent. of total ash; not more than five-tenths (0.5) per cent. of ash insoluble in hydrochloric acid, and not more than ten (10) per cent. of crude fiber.

17. *Coriander* is the dried fruit of *Coriandrum sativum* L.

18. *Cumin seed* is the fruit of *Cuminum cyminum* L.

19. *Dill seed* is the fruit of *Anethum graveolens* L.

20. *Fennel* is the fruit of *Foeniculum foeniculum* (L.) Karst.

21. *Ginger* is the washed and dried or decorticated and dried rhizome of *Zinziber zingiber* (L.) Karst., and contains not less than forty-two (42) per cent. of starch; not more than eight (8) per cent. of crude fiber; not more than six (6) per cent. of total ash; not more than one (1) per cent. of lime, and not more than three (3) per cent. of ash insoluble in hydrochloric acid.

22. *Limed ginger, bleached ginger*, is whole ginger coated with carbonate of lime, and contains not more than ten (10) per

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$\alpha$  Calculated from the total oxygen absorbed by the aqueous extract.



cent. of ash, not more than four (4) per cent. of carbonate of lime, and conforms in other respects to the standard for ginger.

23. *Horse-radish* is the root of the *Roripa armoracia* (L.) Hitchcock, either by itself or ground and mixed with vinegar.

24. *Mace* is the dried arillus of *Myristica fragrans* Houttuyn, and contains not less than twenty (20) nor more than thirty (30) per cent. of nonvolatile ether extract, not more than three (3) per cent. of total ash, and not more than five-tenths (0.5) per cent. of ash insoluble in hydrochloric acid, and not more than ten (10) per cent of crude fiber.

25. *Macassar mace*, *Papua mace*, is the dried arillus of *Myristica argentea* Warb.

26. *Bombay mace* is the dried arillus of *Myristica malabarica* Lamarck.

27. *Marjoram* is the leaf, flower and branch of *Majorana majorana* (L.) Karst.

28. *Mustard seed* is the seed of *Sinapis alba* L. (white mustard), *Brassica nigra* (L.) Koch (black mustard), or *Brassica juncea* (L.) Cosson (black or brown mustard).

29. *Ground mustard* is a powder made from mustard seed, with or without the removal of the hulls and a portion of the fixed oil, and contains not more than two and five-tenths (2.5) per cent. of starch and not more than eight (8) per cent. of total ash.

30. *Prepared mustard*, *German mustard*, *French mustard*, *mustard paste*, is a paste composed of a mixture of ground mustard seed or mustard flour with salt, spices and vinegar, and, calculated free from water, fat and salt, contains not more than twenty-four (24) per cent. of carbohydrates, calculated as starch, determined according to the official methods, not more than twelve (12) per cent. of crude fiber nor less than thirty-five (35) per cent. of protein, derived solely from the materials named.

31. *Nutmeg* is the dried seed of the *Myristica fragrans* Houttuyn, deprived of its testa, with or without a thin coating of lime, and contains not less than twenty-five (25) per cent. of non-volatile ether extract, not more than five (5) per cent. of total ash, not more than five-tenths (0.5) per cent. of ash insoluble in hydrochloric acid, and not more than ten (10) per cent. of crude fiber.

32. *Macassar nutmeg*, *Papua nutmeg*, *male nutmeg*, *long nutmeg* is the dried seed of *Myristica argentea* Warb. deprived of its testa.

## PEPPER.

33. *Black pepper* is the dried immature berry of *Piper nigrum* L. and contains not less than six (6) per cent. of nonvolatile ether extract, not less than twenty-five (25) per cent. of starch, not more than (7) per cent. of total ash, not more than two (2) per cent. of ash insoluble in hydrochloric acid, and not more than fifteen (15) per cent. of crude fiber. One hundred parts of the nonvolatile ether extract contain not less than three and one-quarter (3.25) parts of nitrogen. *Ground black pepper* is the product made by grinding the entire berry, and contains the several parts of the berry in their normal proportions.

34. *Long pepper* is the dried fruit of *Piper longum* L.

35. *White pepper* is the dried mature berry of *Piper nigrum* L., from which the outer coating or the outer and inner coatings have been removed, and contains not less than six (6) per cent. of nonvolatile ether extract, not less than fifty (50) per cent. of starch, not more than four (4) per cent. of total ash, not more than five-tenths (0.5) per cent. of ash insoluble in hydrochloric acid, and not more than five (5) per cent. of crude fiber. One hundred parts of the nonvolatile ether extract contain not less than four (4) parts of nitrogen.

36. *Saffron* is the dried stigma of *Crocus sativus* L.

37. *Sage* is the leaf of *Salvia officinalis* L.

38. *Savory, summer savory*, is the leaf, blossom and branch of *Satureja hortensis* L.

39. *Thyme* is the leaf and tip of blooming branches of *Thymus vulgaris* L.

## b. FLAVORING EXTRACTS.

1. A *flavoring extract*<sup>a</sup> is a solution of ethyl alcohol of proper strength of the sapid and odorous principles derived from an aromatic plant, or parts of the plant, with or without its coloring matter, and conforms in name to the plant used in its preparation.

2. *Almond extract* is the flavoring extract prepared from oil of bitter almonds, free from hydrocyanic acid, and contains not less than one (1) per cent. by volume of oil of bitter almonds.

2a. *Oil of bitter almonds*, commercial, is the volatile oil obtained from the seed of the bitter almond (*Amygdalus communis* L.), the apricot (*Prunus armeniaca* L.), or the peach (*Amygdalus persica* L.).

<sup>a</sup> The flavoring extracts herein described are intended solely for food purposes and are not to be confounded with similar preparations described in the Pharmacopœia for medicinal purposes.

3. *Anise extract* is the flavoring extract prepared from oil of anise, and contains not less than three (3) per cent. by volume of oil of anise.

3a. *Oil of anise* is the volatile oil obtained from the anise seed.

4. *Celery seed extract* is the flavoring extract prepared from celery seed or the oil of celery seed, or both, and contains not less than three-tenths (0.3) per cent. by volume of oil of celery seed.

4a. *Oil of celery seed* is the volatile oil obtained from celery seed.

5. *Cassia extract* is the flavoring extract prepared from oil of cassia and contains not less than two (2) per cent. by volume of oil of cassia.

5a. *Oil of cassia* is the lead-free volatile oil obtained from the leaves or bark of *Cinnamomum cassia* Bl., and contains not less than seventy-five (75) per cent. by weight of cinnamic aldehyde.

6. *Cinnamon extract* is the flavoring extract prepared from oil of cinnamon, and contains not less than two (2) per cent. by volume of oil of cinnamon.

6a. *Oil of cinnamon* is the lead-free volatile oil obtained from the bark of the Ceylon cinnamon (*Cinnamomum zeylanicum* Breyne), and contains not less than sixty-five (65) per cent. by weight of cinnamic aldehyde, and not more than ten (10) per cent. by weight of eugenol.

7. *Clove extract* is the flavoring extract prepared from oil of cloves, and contains not less than two (2) per cent. by volume of oil of cloves.

7a. *Oil of cloves* is the lead-free, volatile oil obtained from cloves.

8. *Ginger extract* is the flavoring extract prepared from ginger, and contains in each one hundred (100) cubic centimeters, the alcohol-soluble matters from not less than twenty (20) grams of ginger.

9. *Lemon extract* is the flavoring extract prepared from oil of lemon, or from lemon peel, or both, and contains not less than five (5) per cent. by volume of oil of lemon.

9a. *Oil of lemon* is the volatile oil obtained, by expression or alcoholic solution, from the fresh peel of the lemon (*Citrus limonum* L.), has an optical rotation (25° C.) of not less than +60° in a 100-millimeter tube, and contains not less than four (4) per cent. by weight of citral.

10. *Terpeneless extract of lemon* is the flavoring extract prepared by shaking oil of lemon with dilute alcohol, or by dissolving terpeneless oil of lemon in dilute alcohol, and contains not less than two-tenths (0.2) per cent. by weight of citral derived from oil of lemon.

10a. *Terpeneless oil of lemon* is oil of lemon from which all of the terpenes have been removed.

11. *Nutmeg extract* is the flavoring extract prepared from oil of nutmeg, and contains not less than two (2) per cent. by volume of oil of nutmeg.

11a. *Oil of nutmeg* is the volatile oil obtained from nutmegs.

12. *Orange extract* is the flavoring extract prepared from oil of orange, or from orange peel, or both, and contains not less than five (5) per cent. by volume of oil of orange.

12a. *Oil of orange* is the volatile oil obtained, by expression or alcoholic solution, from the fresh peel of the orange (*Citrus aurantium* L.) and has an optical rotation (25° C.) of not less than +95° in a 100-millimeter tube.

13. *Terpeneless extract of orange* is the flavoring extract prepared by shaking oil of orange with dilute alcohol, or by dissolving terpeneless oil of orange in dilute alcohol, and corresponds in flavoring strength to orange extract.

13a. *Terpeneless oil of orange* is oil of orange from which all, or nearly all, of the terpenes have been removed.

14. *Peppermint extract* is the flavoring extract prepared from oil of peppermint, or from peppermint, or both, and contains not less than three (3) per cent. by volume of oil of peppermint.

14a. *Peppermint* is the leaves and flowering tops of *Mentha piperita* L.

14b. *Oil of peppermint* is the volatile oil obtained from peppermint, and contains not less than fifty (50) per cent. by weight of menthol.

15. *Rose extract* is the flavoring extract prepared from otto of roses, with or without red rose petals, and contains not less than four-tenths (0.4) per cent by volume of otto of roses.

15a. *Otto of roses* is the volatile oil obtained from the petals of *Rosa damascena* Mill., *R. centifolia* L., or *R. moschata* Herrm.

16. *Savory extract* is the flavoring extract prepared from oil of savory, or from savory, or both, and contains not less than thirty-five hundredths (0.35) per cent. by volume of oil of savory.

16a. *Oil of savory* is the volatile oil obtained from savory.

17. *Spearmint extract* is the flavoring extract prepared from

oil of spearmint, or from spearmint, or both, and contains not less than three (3) per cent. by volume of oil of spearmint.

17a. *Spearmint* is the leaves and flowering tops of *Mentha spicata* L.

17b. *Oil of spearmint* is the volatile oil obtained from spearmint.

18. *Star anise extract* is the flavoring extract prepared from oil of star anise, and contains not less than three (3) per cent. by volume of oil of star anise.

18a. *Oil of star anise* is the volatile oil distilled from the fruit of the star anise (*Illicium verum* Hook).

19. *Sweet basil extract* is the flavoring extract prepared from oil of sweet basil, or from sweet basil, or both, and contains not less than one-tenth (0.1) per cent. by volume of oil of sweet basil.

19a. *Sweet basil, basil*, is the leaves and tops of *Ocimum basilicum* L.

19b. *Oil of sweet basil* is the volatile oil obtained from basil.

20. *Sweet marjoram extract, marjoram extract*, is the flavoring extract prepared from the oil of marjoram, or from marjoram, or both, and contains not less than one (1) per cent. by volume of oil of marjoram.

20a. *Oil of marjoram* is the volatile oil obtained from marjoram.

21. *Thyme extract* is the flavoring extract prepared from oil of thyme, or from thyme, or both, and contains not less than two-tenths (0.2) per cent. of volume of oil of thyme.

21a. *Oil of thyme* is the volatile oil obtained from thyme.

22. *Tonka extract* is the flavoring extract prepared from tonka bean, with or without sugar or glycerin, and contains not less than one-tenth (0.1) per cent. by weight of coumarin extracted from the tonka bean, together with a corresponding proportion of the other soluble matters thereof.

22a. *Tonka bean* is the seed of *Coumarouna odorata* Aublet (*Dipteryx odorata* (Aubl. Willd.).

23. *Vanilla extract* is the flavoring extract prepared from vanilla bean, with or without sugar or glycerin, and contains in one hundred (100) cubic centimeters the soluble matters from not less than ten (10) grams of the vanilla bean.

23a. *Vanilla bean* is the dried, cured fruit of *Vanilla planifolia* Andrews.

24. *Wintergreen extract* is the flavoring extract prepared

from oil of wintergreen, and contains not less than three (3) per cent. by volume of oil of wintergreen.

24a. *Oil of wintergreen* is the volatile oil distilled from the leaves of the *Gaultheria procumbens* L.

### C. EDIBLE VEGETABLE OILS AND FATS.

1. *Olive oil* is the oil obtained from the sound, mature fruit of the cultivated olive tree (*Olea europaea* L.) and subjected to the usual refining processes; is free from rancidity; has a refractive index (25° C.) not less than one and forty-six hundred and sixty ten-thousandths (1.4660), and not exceeding one and forty-six hundred and eighty ten-thousandths (1.4680); and an iodine number not less than seventy-nine (79) and not exceeding ninety (90).

2. *Virgin olive oil* is olive oil obtained from the first pressing of carefully selected, hand-picked olives.

3. *Cotton-seed oil* is the oil obtained from the seeds of cotton plants (*Gossypium hirsutum* L., *G. bardadense* L., or *G. herbaceum* L.) and subjected to the usual refining processes; is free from rancidity; has a refractive index (25° C.), not less than one and forty-seven hundred ten-thousandths (1.4700), and not exceeding one and forty-seven hundred and twenty-five ten-thousandths (1.4725); and an iodine number not less than one hundred and four (104), and not exceeding one hundred and ten (110).

4. "*Winter-yellow*" *cotton-seed oil* is expressed cotton-seed oil, from which a portion of the stearin has been separated by chilling and pressure, and has an iodine number not less than one hundred and ten (110), and not exceeding one hundred and sixteen (116).

5. *Peanut oil*, *arachis oil*, *earthenut oil*, is the oil obtained from the peanut (*Arachis hypogaea* L.) and subjected to the usual refining processes; is free from rancidity; has a refractive index (25° C.), not less than one and forty-six hundred and ninety ten-thousandths (1.4690), and not exceeding one and forty-seven hundred and seven ten-thousandths (1.4707); and an iodine number not less than eighty-seven (87) and not exceeding one hundred (100.)

6. "*Cold-drawn*" *peanut oil* <sup>a</sup> is peanut oil obtained by pressure without heating.

7. *Sesame oil*, *gingili oil*, *teel oil*, is the oil obtained from the seeds of the sesame plants (*Sesamum orientale* L. and *S. radiatum*

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<sup>a</sup> The fixing of limits for chemical and physical properties is reserved for future consideration.

Schum. and Thonn.), and subjected to the usual refining processes; is free from rancidity; has a refractive index ( $25^{\circ}$  C.), not less than one and forty-seven hundred and four ten-thousandths (1.4704) and not exceeding one and forty-seven hundred and seventeen ten-thousandths (1.4717); and an iodine number not less than one hundred and three (103), and not exceeding one hundred and twelve (112.)

8. "*Cold-drawn*" *sesame oil*<sup>a</sup> is sesame oil obtained by pressure without heating.

9. *Poppy-seed oil*<sup>a</sup> is the oil obtained from the seed of the poppy (*Papaver somniferum* L.) subjected to the usual refining processes and free from rancidity.

10. *White poppy-seed oil*, "*cold-drawn*" *poppy-seed oil*,<sup>a</sup> is poppy-seed oil of the first pressing without heating.

11. *Coconut oil*<sup>a</sup> is the oil obtained from the kernels of the coconut (*Cocos nucifera* L.) and subjected to the usual refining processes and free from rancidity.

12. *Cochin oil* is coconut oil prepared in Cochin (Malabar).

13. *Ceylon oil* is coconut oil prepared in Ceylon.

14. *Copra oil* is coconut oil prepared from copra, the dried kernels of the coconut.

15. *Rape-seed oil*, *colza oil*,<sup>a</sup> is the oil obtained from the seeds of the rape plant (*Brassica napus* L.) and subjected to the usual refining processes and free from rancidity.

16. "*Cold-drawn*" *rape-seed oil*<sup>a</sup> is rape-seed oil obtained by the first pressing without heating.

17. *Sunflower oil*<sup>a</sup> is the oil obtained from the seeds of the sunflower (*Helianthus annuus* L.) and subjected to the usual refining processes and free from rancidity.

18. "*Cold-drawn*" *sunflower oil*<sup>a</sup> is sunflower oil obtained by the first pressing without heating.

19. *Maize oil*, *corn oil*,<sup>a</sup> is the oil obtained from the germ of the maize (*Zea mays* L.) and subjected to the usual refining processes and free from rancidity.

20. *Cocoa butter*, *cacao butter*, is the fat obtained from roasted, sound cocoa beans, and subjected to the usual refining processes; is free from rancidity; has a refractive index ( $40^{\circ}$  C.) not less than one and forty-five hundred and sixty-six ten-thousandths (1.4566), and not exceeding one and forty-five hundred and ninety-eight ten-thousandths (1.4598); an iodine number not less than

<sup>a</sup> The fixing of limits for chemical and physical properties is reserved for future consideration.

thirty-three (33) and not exceeding thirty-eight (38); and a melting point not lower than 30° C. nor higher than 35° C.

21. *Cotton-seed oil stearin* is the solid product made by chilling cotton-seed oil and separating the solid portion by filtration, with or without pressure, and having an iodine number not less than eighty-five (85), and not more than one hundred (100).

#### E. TEA, COFFEE AND COCOA PRODUCTS.

1. *Tea* is the leaves and leaf buds of different species of *Thea*, prepared by the usual trade processes of fermenting, drying, and firing; meets the provisions of the act of Congress, approved March 2, 1897, and the regulations made in conformity therewith (Treasury Department Circular 16, February 6, 1905); conforms in variety and place of production to the name it bears; and contains not less than four (4) nor more than seven (7) per cent. of ash.

##### b. COFFEE.

1. *Coffee* is the seed of *Coffea arabica* L. or *Coffea liberica* Bull., freed from all but a small portion of its spermoderm, and conforms in variety and place of production to the name it bears.

2. *Roasted coffee*, which, by the action of heat, has become brown and developed its characteristic aroma, and contains not less than ten (10) per cent. of fat, and not less than three (3) per cent. of ash.

##### c. COCOA AND COCOA PRODUCTS.

1. *Cocoa beans* are the seeds of the cacao tree, *Theobroma cacao* L.

2. *Cocoa nibs, cracked cocoa*, is the roasted, broken cocoa bean freed from its shell or husk.

3. *Chocolate, plain chocolate, bitter chocolate, chocolate liquor, bitter chocolate coatings*, is the solid or plastic mass obtained by grinding cocoa nibs without the removal of fat or other constituents except the germ, and contains not more than three (3) per cent. of ash insoluble in water, three and fifty hundredths (3.50) per cent. of crude fiber, and nine (9) per cent. of starch, and not less than forty-five (45) per cent. of cocoa fat.

4. *Sweet chocolate, sweet chocolate coatings*, is chocolate mixed with sugar (sucrose), with or without the addition of cocoa butter, spices, or other flavoring materials, and contains in the sugar and fat-free residue no higher percentage of either ash,



fiber, or starch than is found in the sugar and fat-free residue of chocolate.

5. *Cocoa, powdered cocoa*, is cocoa nibs, with or without the germ, deprived of a portion of its fat and finely pulverized, and contains percentages of ash, crude fiber, and starch corresponding to those in chocolate after correction for fat removed.

6. *Sweet cocoa, sweetened cocoa*, is cocoa mixed with sugar (sucrose), and contains not more than sixty (60) per cent of sugar (sucrose), and in the sugar and fat-free residue no higher percentage of either ash, crude fiber, or starch than is found in the sugar and fat-free residue of chocolate.

## F. BEVERAGES.

### a. FRUIT JUICES—FRESH, SWEET AND FERMENTED.

#### 1. FRESH AND 2. SWEET.

(Schedules in preparation.)

#### 3. FERMENTED FRUIT JUICES.

1. *Wine* is the product made by the normal alcoholic fermentation of the juice of sound, ripe grapes, and the usual cellar treatment,<sup>a</sup> and contains not less than seven (7) nor more than sixteen (16) per cent. of alcohol, by volume, and, in one hundred (100) cubic centimeters (20° C.), not more than one-tenth (0.1) gram of sodium chlorid nor more than two-tenths (0.2) gram of potassium sulphate; and for red wine not more than fourteen hundredths (0.14) gram, and for white not more than twelve hundredths (0.12) gram of volatile acids produced by fermentation and calculated as acetic acid. *Red wine* is wine containing the red coloring matter of the skins of grapes. *White wine* is wine made from white grapes or the expressed fresh juice of other grapes.

2. *Dry wine* is wine in which the fermentation of the sugars is practically complete, and which contains, in one hundred (100) cubic centimeters (20° C.), less than one (1) gram of sugars, and for dry red wine not less than sixteen hundredths (0.16) gram of grape ash and not less than one six-tenths (1.6) grams of sugar-free grape solids, and for dry white wine not less than thirteen hundredths (0.13) gram of grape ash and not less than one and four-tenths (1.4) grams of sugar-free grape solids.

<sup>a</sup> The subject of sulphurous acid in wine is reserved for consideration in connection with the schedule, "Preservatives and Coloring Matters."

3. *Fortified dry wine* is dry wine to which brandy has been added, but which conforms in all other particulars to the standard of dry wine.

4. *Sweet wine* is wine in which the alcoholic fermentation has been arrested, and which contains, in one hundred (100) cubic centimeters ( $20^{\circ}$  C.), not less than one (1) gram of sugars, and for sweet red wine not less than sixteen hundredths (0.16) gram of grape ash, and for sweet white wine not less than thirteen hundredths (0.13) gram of grape ash.

5. *Fortified sweet wine* is sweet wine to which wine spirits have been added. By act of Congress, "sweet wine" used for making fortified sweet wine and "wine spirits" used for such fortification are defined as follows (sec. 43, Act of October 1, 1890, 26 Stat., 567, as amended by section 68, Act of August 27, 1894, 28 Stat., 509, and further amended by act of Congress, approved June 7, 1906): "That the wine spirits mentioned in section 42 of this act is the product resulting from the distillation of fermented grape juice, to which water may have been added prior to, during, or after fermentation, for the sole purpose of facilitating the fermentation and economical distillation thereof, and shall be held to include the products from grapes or their residues, commonly known as grape brandy; and the pure sweet wine, which may be fortified free of tax, as provided in said section, is fermented grape juice only, and shall contain no other substance whatever introduced before, at the time of, or after fermentation, except as herein expressly provided; and such sweet wine shall contain not less than four per centum of saccharine matter, which saccharine strength may be determined by testing with Balling's saccharometer or must scale, such sweet wine, after the evaporation of the spirits contained therein, and restoring the sample tested to original volume by addition of water: *Provided*, That the addition of pure boiled or condensed grape must or pure crystallized cane or beet sugar or pure anhydrous sugar to the pure grape juice aforesaid, or the fermented product of such grape juice prior to the fortification provided by this act for the sole purposes of perfecting sweet wine according to commercial standard, or the addition of water in such quantities only as may be necessary in the mechanical operation of grape conveyers, crushers, and pipes leading to fermenting tanks, shall not be excluded by the definition of pure sweet wine aforesaid: *Provided, however*, That the cane or beet sugar, or pure anhydrous sugar, or water, so used shall not in either case be in excess of ten (10) per centum of the weight

of the wine to be fortified under this Act: *And provided further*, That the addition of water herein authorized shall be under such regulations and limitations as the Commissioner of Internal Revenue, with the approval of the Secretary of the Treasury, may from time to time prescribe; but in no case shall such wines to which water has been added be eligible for fortification under the provisions of this Act where the same, after fermentation and before fortification, have an alcoholic strength of less than five per centum of their volume."

6. *Sparkling wine* is wine in which the after part of the fermentation is completed in the bottle, the sediment being disgorged and its place supplied by wine or sugar liquor, and which contains, in one hundred (100) cubic centimeters (20° C.), not less than twelve hundredths (0.12) gram of grape ash.

7. *Modified wine, ameliorated wine, corrected wine*, is the product made by the alcoholic fermentation, with the usual cellar treatment, of a mixture of the juice of sound, ripe grapes with sugar (sucrose), or a sirup containing not less than sixty-five (65) per cent. of sugar (sucrose), and in quantity not more than enough to raise the alcoholic strength after fermentation, to eleven (11) per cent. by volume.

8. *Raisin wine* is the product made by the alcoholic fermentation of an infusion of dried or evaporated grapes, or of a mixture of such infusion, or of raisins with grape juice.

b. MEAD, ROOT BEER, ETC.

(Schedule in preparation.)

c. MALT LIQUORS.

(Schedule in preparation.)

d. SPIRITUOUS LIQUORS.

(Schedule in preparation.)

e. CARBONATED WATERS, ETC.

(Schedule in preparation.)

G. VINEGAR.

1. *Vinegar, cider vinegar, apple vinegar*, is the product made by the alcoholic and subsequent acetous fermentations of the juice of apples, is lævo-rotatory, and contains not less than four (4)

grams of acetic acid, not less than one and six-tenths (1.6) grams of apple solids, of which not more than fifty (50) per cent. are reducing sugars, and not less than twenty-five hundredths (0.25) gram of apple ash in one hundred (100) cubic centimeters (20° C.); and the water-soluble ash from one hundred (100) cubic centimeters (20° C.) of the vinegar contains not less than ten (10) milligrams of phosphoric acid ( $P_2O_5$ ), and requires not less than thirty (30) cubic centimeters of decinormal acid to neutralize its alkalinity.

2. *Wine vinegar, grape vinegar*, is the product made by the alcoholic and subsequent acetous fermentations of the juice of grapes, and contains, in one hundred (100) cubic centimeters (20° C.), not less than four (4) grams of acetic acid, not less than one (1.0) gram of grape solids, and not less than thirteen hundredths (0.13) grams of grape ash.

3. *Malt vinegar* is the product made by the alcoholic and subsequent acetous fermentations, without distillation, of an infusion of barley malt or cereals whose starch has been converted by malt, is dextro-rotatory, and contains, in one hundred (100) cubic centimeters (20° C.), not less than four (4) grams of acetic acid, not less than two (2) grams of solids, and not less than two-tenths (0.2) gram of ash; and the water-soluble ash from one hundred (100) cubic centimeters (20° C.) of vinegar contains not less than nine (9) milograms of phosphoric acid ( $P_2O_5$ ), and requires not less than four (4) cubic centimeters of decinormal acid to neutralize its alkalinity.

4. *Sugar vinegar* is the product made by the alcoholic and subsequent acetous fermentations of solutions of sugar, sirup, molasses, or refiners' sirup, and contains, in one hundred (100) cubic centimeters (20° C.), not less than four (4) grams of acetic acid.

5. *Glucose vinegar* is the product made by the alcoholic and subsequent acetous fermentations of solutions of starch sugar or glucose, is dextro-rotatory, and contains, in one hundred (100) cubic centimeters (20° C.), not less than four (4) grams of acetic acid.

6. *Spirit vinegar, distilled vinegar, grain vinegar*, is the product made by the acetous fermentations of dilute distilled alcohol, and contains, in one hundred (100) cubic centimeters (20° C.), not less than four (4) grams of acetic acid.

## III. SALT.

1. *Table salt, dairy salt*, is fine-grained crystalline salt, containing on a water-free basis, not more than one and four-tenths (1.4) per cent. of calcium sulphate ( $\text{CaSO}_4$ ), nor more than five-tenths (0.5) per cent. of calcium and magnesium chlorids ( $\text{CaCl}_2$  and  $\text{MgCl}_2$ ), nor more than one-tenth (0.1) per cent. of matters insoluble in water.

## IV. PRESERVATIVES AND COLORING MATTER.

(Schedules in preparation.)

[S. B. 48.]

## DAIRY AND FOOD COMMISSIONER.

AN ACT to amend an act entitled "An act to create the office of state dairy commissioner, and to define his term of service, duties and powers," approved April 8, 1905, by repealing sections 1 and 2, and enacting three new sections in lieu thereof, to be known as sections 1, 2 and 2a; and by adding eight new sections thereto, to be known as sections 10, 11, 12, 13, 14, 15, 16 and 17; and appropriating money for the enforcement of said act as amended.

## SECTION

1. Amending.
  1. Appointment — confirmation — term—vacancy.
  2. Bond—salary.
  - 2a. Powers and duties—deputy.
2. Amending.
  10. To inspect certain foods and drugs—to make rules.
  11. To make purchase of foods offered for sale and make analysis.

## SECTION

12. By whom tested—evidence—to make complaint.
13. Duty of prosecuting attorney.
14. Notice of finding—hearing to be granted—goods to be seized—judgment—appeal.
- 14a. Notice by publication.
15. Commissioner to report — to whom.
16. Appropriation for.
- 16a. Disposition of articles on hand.
17. Repealing conflicting laws.

*Be it enacted by the General Assembly of the State of Missouri, as follows:*

SECTION 1. That sections 1 and 2 of an act entitled "An act to create the office of state dairy commissioner, and to define his term of service, duties and powers," approved April 8, 1905, be and the same are hereby repealed and the following three sections enacted in lieu thereof, to be known as sections 1, 2 and 2a, in words and figures as follows:

Section 1. Within 30 days after this act shall take effect, the governor, by and with the advice and consent of the senate, shall appoint a suitable person to be dairy and food commissioner, which office is hereby created, and which commissioner so appointed shall hold office until the first day of February, 1909, and until his successor is appointed and qualified. At the next regular session of the legislature, and every four years thereafter, the governor, by and with the advice and consent of the senate, shall appoint a dairy and food commissioner, who shall hold office for a term of four years from the first day of February of the year of his appointment and until his successor is appointed and qualified. Said commissioner shall be subject to removal by the governor for cause, and in case of vacancy in said office from any cause the governor shall appoint another person to fill the same for the unexpired term.

Section 2. Before entering upon the duties of his office, the person appointed as dairy and food commissioner shall make, subscribe and file in the office of the secretary of state, the oath of

office prescribed by the Constitution and shall give bond to the state in the sum of ten thousand dollars, with sureties to be approved by the governor, conditioned for the faithful performance of his duties. Said commissioner shall receive a salary of two thousand dollars a year, payable in monthly installments, and his actual necessary traveling expenses while in the discharge of his official duties. He shall be provided with an office by the state board of agriculture at the seat of the state agricultural college.

Section 2a. The said commissioner shall have power to appoint a deputy, who shall have the same powers as the commissioner, and who shall receive a salary of twelve hundred dollars a year, payable monthly, and necessary traveling expenses. Said commissioner may also appoint, from time to time, such inspectors, as the proper performance of the duties of his office may require, not exceeding six in number. They shall be paid at the rate of one thousand dollars per year for time actually employed, payable monthly, and actual expenses incident to the discharge of their duties. The persons so appointed shall have power to administer oaths in matters relative to the dairy and food laws, and shall have the same right of access to the places to be inspected as the said commissioner or his deputy. The said deputy and inspectors shall hold office during the pleasure of the commissioner, and shall take and subscribe the oath of office and give bond to the state in such sum and with such sureties as may be approved by the commissioner, conditioned for the faithful performance of their respective duties. The necessary chemical work of the office shall be done by or under the supervision of the chemist of the state experiment station.

SEC. 2. That said act entitled "An act to create the office of state dairy commissioner, and to define his term of service, duties and powers," approved April 8 1905, be and the same is hereby amended by adding eight new sections thereto, to be known as sections 10, 11, 12, 13, 14, 15, 16 and 17, which said sections are in words and figures, as follows:

Section 10. It shall be the duty of the dairy and food commissioner to enforce all laws that now exist, or that may hereafter be enacted, regarding the production, manufacture or sale of dairy products, or the adulteration of any article of food or drug, or the misbranding of the same; and personally, or by his assistants, inspect any article of food or drug made or offered for sale in this state, which he may, through himself or his assistants, suspect or have reason to believe are impure, unhealthful, adulterated or mis-

branded, and to prosecute, or cause to be prosecuted, any person or persons, firm or corporation engaged in the manufacture or sale of food or drugs, or dairy products, contrary to the laws of this state. Said commissioner shall make rules and regulations for carrying out the provisions of this act, and such rules and regulations shall conform as nearly as practicable to the rules and regulations at present established and which may hereafter be established for the enforcement of the act of congress approved June 30, 1906, and known as the "Food and drugs act."

Section 11. It shall be the duty of any officer entrusted with the enforcement of this act, when he is required thereto by any person, to purchase from the vendor of any article sold or exposed for sale a sample thereof, and submit it for analysis, in accordance with the provisions of this act: Provided, the person so requiring such purchase and analysis deposits with such officer, at the time such a demand is made, a sum of money sufficient to pay for such sample and analysis. If upon analysis such article is found to be adulterated, within the meaning of this act, such deposit shall be returned to him.

Section 12. The dairy and food commissioner, his deputy, or any one by him appointed, is hereby authorized and empowered to enter during business hours, in the performance of his duties, any factory, store, salesroom, warehouse, laboratory, drug store, or any other place where foods or drugs are stored or exposed for sale, or place where they have reason to believe such foods or drugs are kept or offered for sale; and he may, in lawful manner, procure samples of the said articles of food or drugs, or imitation thereof, suspected of being made or sold in violation of law, and cause the same to be analyzed or satisfactorily tested by the chemist of the state experiment station; and such analysis or test shall be recorded and preserved as evidence, and the certificate of such analysis or test, when sworn to by such chemist, shall be admitted as evidence of the facts therein contained in all prosecutions that may result from such violation; and it shall be the duty of said commissioner to make complaint of such violation in the proper county, and furnish the prosecuting attorney with the evidence thereof, and obtain a conviction for the offense charged. And in the discharge of his duties said commissioner, his deputy and assistants, shall have power to open any cask, tub, jar, bottle or package containing, or supposed to contain, any article of food or drugs, and examine, or cause to be examined, the contents thereof, and take therefrom samples in the presence of at least one witness; and he shall, in the



presence of such witness, mark or seal such samples, and shall tender at the time of taking, to the manufacturer or vendor of such food or drug, or to the person having the custody of the same, the value thereof; samples may be purchased in the open market or at [the] factory, and if in bulk, the marks, brands or tags upon the package, carton, wrapper or other container, and the accompanying printed or written matter shall be noted. The collector shall also note the names of the vendor and agent through whom the sale was actually made, together with the date of the purchase. Samples shall be divided into three equal parts; each part shall be labeled with identifying marks. One of the parts shall be delivered to the person from whom the purchase was made, or (of) [if] a guaranty has been given, such part shall be delivered to the guarantor. One of the parts shall be sent to the chemist of the state experiment station and one part shall be held under seal by the commissioner. The parts of the sample so divided shall be sealed by the collector with a seal provided for that purpose. Any person who shall obstruct the commissioner, or any of his assistants, by refusing to allow him entrance to any place which he desires to enter in the discharge of his official duty, or refuse to deliver to him a sample of any article of food or drug made, sold, offered or exposed for sale by such person, when the same is requested, and when the value thereof is tendered, shall be guilty of a misdemeanor, punishable by a fine of not exceeding fifty (\$50) dollars for the first offense, and not exceeding five hundred (\$500) dollars, nor less than fifty (\$50) dollars, for each subsequent offense.

Section 13. It shall be the duty of the prosecuting attorney in any county or city in the state, when called upon by the commissioner or any of his assistants, to render any legal assistance in his power to execute the laws, and to prosecute cases arising under the provisions of this act.

Section 14. When the examination shows that the provisions of this act have been violated, the said commissioner shall first cause notice of such fact, together with a copy of the findings, to be given to the party or parties from whom the sample was obtained, and to the party, if any, whose name appears upon the label as manufacturer, packer, wholesaler, retailer or other dealer. The parties so notified shall be given opportunity to be heard under such rules and regulations as may be prescribed as aforesaid. Notice shall specify (this) [the] date, hour and place of the hearing. The hearing shall be private and shall take place at the office of the commissioner, and the parties interested therein may appear

in person or by attorney. If the party whose name appears upon the label resides without the state he shall be entitled to reasonable notice by mail, at such address as may, with due diligence, be obtained. If, after such hearing, it appear that said food, drug or dairy product is adulterated or misbranded, or is a substitute or an imitation within the meaning of any law providing against the adulteration, misbranding, imitation or substitution of food, drugs and dairy products, said commissioner, or his deputy, or any person by him duly authorized, shall seize such goods and make complaint before any justice of the peace having jurisdiction in the city, village or township where such goods are seized; and thereupon such justice of the peace shall issue his summons to the persons from whom said goods were seized, directing him to appear not less than five nor more than ten days from the date of the issuing of said summons, and show cause why said goods should not be condemned and disposed of. If the said person from whom the said goods were taken or seized cannot be found, said summons shall be served upon the person then in possession of the goods. The said summons shall be served at least five days before the time for appearance mentioned therein. If the person from whom said goods were seized cannot be found, and no one can be found in possession of said goods, and the defendant shall not appear on the return day, then said justice of the peace shall proceed in said cause in the same manner provided by law where a writ of attachment is returned not personally served upon any of the defendants, and none of the defendants appears upon the return day. Unless cause to the contrary thereof be shown, or if said goods shall be found upon trial, to be in violation of any of the provisions of this act or other laws which may now exist, or which may be hereafter enacted, it shall be the duty of said justice of the peace to render judgment that said seized property be forfeited to the state of Missouri, and that said goods be destroyed, or sold by said commissioner, for any purpose other than to be used for food. The mode of procedure before said justice shall be the same, as near as may be, as in civil proceedings before justices of the peace. Either parties may appeal to the circuit court as appeals are taken from justice courts, but it shall not be necessary for the state to give appeal bond. The proceeds arising from such sales shall be paid into the state treasury and credited to the general fund: Provided, that if the owner or party claiming the property or goods declared forfeited can produce and prove a written guaranty of purity, signed by the wholesaler, jobber, manufacturer or other person residing

in this state, from whom said articles were purchased, then the proceeds of the sale of such articles, over and above the cost of seizure, forfeiture and sale, shall be paid over to such owner or claimant, to reimburse him, to the extent, of such surplus, for his actual loss resulting from such seizure and forfeiture, as shown by the invoice.

Section 14a. After judgment of the court, notice shall be given by publication in such manner as may be prescribed by the rules and regulations aforesaid. If an appeal be taken from the judgment of the court before such publication, notice of that fact shall accompany the publication.

Section 15. The commissioner shall make an annual report to the governor, on or before the first day of January of each year, which shall be printed and published. Such report shall cover the work of his office for the preceding year and shall show, among other things, the number of specimens of food products analyzed, and the report of the analyst upon each one when the analysis indicates the same to be contrary to law; the number of complaints entered against persons for violations of law relative to the adulteration and misbranding of food and drugs; the number of convictions had and the amount of fines imposed therefor; an account of the money received and expended by him and his assistants, together with such recommendations relative to the statutes in force as his experience may justify. The commissioner may also prepare, print and distribute a monthly bulletin containing the results of inspections, the results of analysis made, or caused to be made, with proper explanations of the same, and such other information as may come to him in his official capacity, relating to the adulteration and misbranding of foods and drugs and of dairy products, so far as he may deem of benefit and advantage to the public; also a brief summary of the work done during the month by the commissioner and his assistants in the enforcement of the laws of the state; but not more than ten thousand copies of each of the monthly bulletins shall be printed, which printing shall be done by the state printer and shall be paid for in the same manner as other state printing.

Section 16. For the purpose of carrying into effect the provisions of this act and of the act entitled "An act to create the office of state dairy commissioner, and to define his term of service, duties and powers," approved April 8, 1905, as amended by this act, there is hereby appropriated, out of the state treasury, chargeable to the general revenue fund, the sum of twenty-five thousand

(\$25,000) dollars, or so much thereof as may be necessary for the payment of salaries and all expenses authorized by this act.

Section 16a. All articles of foods and drugs in the hands of retailers and jobbers when this law goes into effect may be sold in the condition in which they are found, provided such articles are branded to the effect that the same were on hand July 1, 1907.

Section 17. All laws in conflict or inconsistent with, or repugnant to the provisions of this act, are hereby repealed.

Approved March 22, 1907.

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(This law is the law which was amended by S. B. 48.)

#### STATE DAIRY COMMISSION.

Sec. 1. *State Dairy Commissioner; bond; salary; report.* There is hereby created the office of State Dairy Commissioner, and, immediately after this act goes into effect, every two years thereafter, the Governor shall, with the advice and consent of the Senate, appoint a suitable person, to be known and designated as "State Dairy Commissioner," who shall have a practical knowledge of and experience in the manufacture of dairy products, who shall hold his office for two years from the first day of May, or until his successor is appointed and qualified, subject to removal by the Governor for inefficiency, neglect or violation of duty. He shall give bond in the sum of ten thousand dollars (\$10,000), conditioned for the faithful performance of his duties, with sureties to be approved by and filed with the Governor. Said commissioner shall receive a salary of two thousand dollars (\$2,000) a year, payable monthly, and his actual necessary traveling expenses while in the discharge of his official duties. He shall make an annual report to the Governor not later than January 1 of each year, and shall be furnished an office by the State Board of Agriculture at the seat of the State Agricultural College.

Sec. 2. *Deputy Commissioner; chemist.* The said Commissioner shall have power, when necessary, to appoint a deputy, whose salary shall not exceed \$1,200 per year, and the necessary chemical work of his office shall be done by the chemist of the State Agricultural College.

Sec. 3. *Duties of Commissioner.* It shall be the duty of the State Dairy Commissioner to inspect, or cause to be inspected, all creameries, public dairies, butter and cheese factories at least once a year, and oftener, if possible, prescribe such reasonable rules and regulations for their operation as he deems necessary to fully

carry out the provisions of laws now in force or that may be hereafter enacted relative to dairy products for the promotion and maintenance of public health and safety; compile and publish, annually, statistics and information concerning all phases of the dairy industry in this State; co-operate with the State Board of Agriculture in the holding of farmers' institutes, special dairy meetings, and in general strive for the promotion of the best interests of the dairy industry throughout the State. He shall keep on hand a supply of standard test tubes or bottles and milk measures or pipettes adapted to the use of each milk testing machine, the manufacturers or dealers of which have filed with the State Dairy Commissioner a certificate from the director of the Missouri Agricultural Experiment Station that said milk testing machine, when properly operated, will produce accurate measurements of butter fat, and to furnish same at actual cost to any person desiring them, upon written request therefor, such tubes, bottles, measures and pipettes to be stamped with the letters "S. D. C." as certifying to their accuracy. He shall preserve in his office all correspondence, records, documents and property of the State pertaining thereto and turn over same to his successor. He shall devote his whole time to the duties of his office, and, during his term, shall hold no other official or business position nor any professorship in any educational institution.

Sec. 4. *Authority of Commissioner—inspections, samplings, reports, examining witnesses, etc.* In the performance of his official duty the State Dairy Commissioner is hereby authorized and empowered to enter during business hours all creameries, public dairies, butter and cheese factories or other places where dairy products are sold or kept for sale, for the purpose of inspecting same; to take samples anywhere of any dairy product, or imitation thereof, suspected of being made or sold in violation of law, and cause the same to be analyzed or satisfactorily tested by the State Agricultural College chemist, and such analysis or test shall be recorded and preserved as evidence, and the certificate of such test, when sworn to by such chemist, shall be admitted in evidence in all prosecutions that may result under the operations of this act; to require the owner, agent or manager of every creamery, public dairy, butter and cheese factory to report annually, on or before September 1st for the year ending July 1st, on blanks to be furnished by the State Dairy Commissioner, full and accurate information concerning the quantity of milk bought, sold or used, the average price of same, the quantity of butter or cheese produced or

sold, and the average price of same, the number of cows used in or contributing to the operation of such creamery, dairies and factories; to examine, under oath or otherwise, any person whom he may believe has knowledge concerning the unlawful operation of any creamery, public dairy, butter or cheese factory, to issue subpoena requiring the appearance of witnesses and the production of books and papers and administer oaths with like effect as is done in courts of law in this State, and it shall be the duty of any circuit court, or the judge thereof, upon the application of said commissioner, to issue an attachment for such witnesses and compel him or them to attend before the Commissioner and give testimony upon such matters as he or they shall be lawfully required by such Commissioner, and said court or judge shall have power to punish for contempt as in other cases of refusal to obey the orders and processes of the court.

Sec. 5. *Definition; penalty for selling milk containing foreign substances.* The terms "creameries, public dairies, butter and cheese factories," for the purposes of this act, shall be construed to mean such as produce or manufacture dairy products, either genuine or imitation, for sale either at wholesale or retail to the general public, and shall not include farmers or others who produce a small surplus of such products in excess of their family needs. In all prosecutions and proceedings for the enforcement in any of the courts in this State of all laws and regulations of whatsoever nature now in force, or that may hereafter be enacted pertaining to the production, sale and distribution of dairy products of any kind whatsoever, the standards of purity and the definition of said products, shall be such as are now, or may hereafter be, adopted, recognized and published by the officials of the United States Department of Agriculture, and whosoever shall sell, or offer or expose for sale anywhere in this State, milk or cream containing any foreign substance or preservative of any kind whatsoever injurious to health, shall be guilty of a misdemeanor, and on conviction, be fined not less than ten dollars, nor more than one hundred dollars for each offense.

Sec. 6. *Penalty for hindering execution of law.* Any person or persons, firm or corporation who shall hinder or obstruct, or in any way interfere with the said State Dairy Commissioner or his deputies while discharging the duties of inspection, or who fail or refuse to make the reports provided for by section 4 of this act, shall, on conviction, be fined not less than ten nor more than one hundred dollars, or imprisonment in jail not less than

ten nor more than ninety days, or by both such fine and imprisonment.

Sec. 7. *Appropriation.* For the purpose of carrying into effect the provisions of this act there is hereby appropriated out of the State treasury, chargeable to the general revenue fund, the sum of ten thousand dollars (\$10,000), or so much thereof as may be necessary for paying the salary of the State Dairy Commissioner and his assistants, and the necessary traveling and printing expenses of the same for the years 1905 and 1906.

Sec. 8. *Emergency.* The advancement of the interests of the dairy industry as contemplated by this act creates an emergency within the meaning of the Constitution; therefore, this act shall take effect and be in force from and after its passage.

Sec. 9. *Repeal.* All laws and parts of laws of whatsoever nature, in conflict or inconsistent or repugnant to the provisions of this act, are hereby repealed.

Approved April 8, 1905. Laws of 1905 (H. B. 300), pp. 133-135.

(The following are the old dairy and food laws of Missouri which will be more or less effected by the passage of Senate Bills 47 and 48.)

## OLD DAIRY AND FOOD LAWS.

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2266. *Unwholesome meat, bread, or drink; penalty.* Every person who shall knowingly sell the flesh of any animal dying otherwise than by slaughter, or slaughtered when diseased, or shall sell the flesh as of one animal, knowing it to be that of another species, or shall sell unwholesome bread or drink without making the same fully known to the purchaser; and any butcher or other person who shall sell or offer to sell the meat of any calf which was killed before it had attained to the age of six weeks, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine not exceeding one thousand dollars, or by imprisonment in the county jail not exceeding one year.

2267. *Cleanliness of food receptacles.* It shall be unlawful for any person, firm or corporation to use any barrel, lard tierce, preserve or butter tub, having been once used, for the purpose of packing or storing any article of human food therein, unless such barrel, lard tierce, preserve or butter tub has been thoroughly cleaned or scoured before its subsequent use.

2268. *Penalty.* Any person violating the provisions of the foregoing section shall be deemed guilty of a misdemeanor, and on conviction thereof, shall be fined not less than five dollars nor more than twenty dollars for each offense; and by the using of any single article, as before mentioned, shall constitute a separate offense.

2269. *Adulteration of food and drugs.* Every person who shall fraudulently adulterate, for the purpose of sale, anything intended for food or drink, or any drugs or medicine, shall be deemed guilty of a misdemeanor.

Revised Statutes, 1899, Vol. 1, p. 627.

2286. *Ingredients prohibited.* It shall be unlawful for any person or corporation doing business in this State to manufacture, sell or offer to sell, any article, compound or preparation, for the purpose of being used or which is intended to be used in the preparation of food, in which article, compound or preparation there is any arsenic, calomel, bismuth or ammonia.



2287. *Penalty.* Any person or corporation violating the provisions of section 2286, shall be deemed guilty of a misdemeanor, and shall, upon conviction, be fined not less than one hundred dollars, which shall be paid into and become a part of the road fund of the county in which such fine is collected.

Revised Statutes, 1899, Vol. 1, p. 631.

6127. *Cities may provide for inspection of animals intended for food.* All cities in this State are hereby empowered to provide, by ordinance, for the inspection, while living, of all animals intended as human food within such cities.

Revised Statutes, 1899, Vol. 2, p. 1437.

#### ALCOHOLIC BEVERAGES,

2278. *Poisonous ingredients; penalty.* Any person who shall adulterate, by the use of strychnine or other poisonous liquids or ingredients, any spirituous, fermented, malt or vinous liquors, or shall sell any such liquors by retail or wholesale, knowing the same to be adulterated as aforesaid by or with strychnine or other poisonous liquids or ingredients, shall be deemed guilty of a felony, and, upon conviction thereof, be punished by imprisonment in the penitentiary not exceeding five years.

2288. *Adulterated hops, malt or yeast, in beer; penalty.* No substitute for hops or the pure extract of hops, or of pure barley malt or wholesome yeast shall be used in the manufacture of ale or beer in this State, and all ale or beer shown to contain any substance used as a substitute for hops, or pure extract of hops, or pure barley malt or wholesome yeast, is hereby declared adulterated. Whoever manufactures for sale any ale or beer adulterated, as referred to in this section, or sells, or offers to sell, any such ale or beer, knowing it to be adulterated, as aforesaid, shall be deemed guilty of a misdemeanor, and, upon conviction, shall be punished by a fine of not less than five hundred and not more than five thousand dollars, or by imprisonment in the county jail not less than one month nor more than six months, or by both such fine and imprisonment.

2289. *Liquor dealers' oath and bond.* It shall not be lawful for any person or persons to sell, or offer to sell, any spirituous, fermented, malt or alcoholic liquors within this State until he, she or they shall first appear before the county court clerk of the county where such liquors are to be sold or offered for sale, and take and subscribe an oath not to mix or adulterate, with any substance whatever, the liquors offered for sale, and give bond in the

sum of five hundred dollars, with good and sufficient surety, for the payment of all costs arising from prosecutions for violations of the provisions of this article in relation to the adulteration and sale of intoxicating liquors.

2290. *Liquor manufacturers' oath.* It shall not be lawful for any person or persons to manufacture or rectify any spirituous, fermented, malt or alcoholic liquors within the limits of this State until he, she or they shall first appear before the county court clerk of the county where such liquors are proposed to be manufactured or rectified, and take and subscribe an oath not to adulterate, or suffer to be adulterated, any liquors manufactured or rectified by themselves or agents.

2291. *Liquor dealers' affidavit.* Before any person or co-partnership of persons shall be authorized to sell intoxicating liquors he, she or they shall file with the clerk of the county court, in the county where it is desired to sell the same, an affidavit to the following effect, to wit:

I, A B, do solemnly swear that I will not mix or adulterate, with any poisonous substance whatever, any distilled or fermented liquors, or any composition of which distilled or fermented liquors form a part, nor will I mix the different kinds of liquors together for the sake of profit, nor dilute the same with water, nor will I permit the same to be done.

2292. *Penalty.* If any person or persons shall sell any spirituous, fermented, malt or alcoholic liquors in violation of or without complying with the three next preceding sections, he or they shall be deemed guilty of a misdemeanor, and on conviction be punished by a fine of not less than fifty nor more than five hundred dollars.

2293. *Druggists, etc., exempt.* Nothing herein shall be so construed as to prevent druggists, physicians or persons engaged in the mechanical arts from mixing and adulterating liquors for medicinal or mechanical purposes, to be by them used in their business.

2294. *Summons by grand jury.* The grand jury may send for persons or papers in cases where they may be of the opinion that any person or persons have been guilty of violating any of the provisions of sections 2278, 2279, 2288, 2289, 2290, 2291, 2292 and 2293,.

Revised Statutes, 1889, Vol. 1, 632.

7682. (Sec. 1.) *Appointment of inspector of beer and malt products.* There is hereby created the office of beer inspector,

which shall be filled by appointment by the governor, by and with the consent of the Senate, within thirty days after the taking effect of this act, an inspector of beer and malt products, who shall serve for a term of four years and until his successor is duly appointed and qualified. He shall be an expert beer brewer and a citizen of he United States and of this State for more than two years next prior to his appointment. He shall give a bond in the sum of twenty-five thousand dollars, to be approved by the Governor, for the faithful performance of the duties of his office.

7683. (Sec. 2.) *Deputies and clerical help.* Said inspector shall, with the approval of the Governor, appoint such deputies as may be required to carry out the provisions of this article, not to exceed four in number, and such clerical help as may be necessary. Said deputies shall each receive for their services the sum of fifteen hundred dollars per annum, and said inspector shall receive the sum of three thousand dollars per annum, all salaries and expenses to be paid out of the sums of money now, or that may hereafter be, appropriated for said purpose.

7684. (Sec. 3.) *Inspection of beer obligatory.* Every person, persons or corporation who shall erect or keep a brewery for the manufacture or brewing of beer or other malt products within this State, for the purpose of offering the same for sale, shall cause the same to be inspected by the said State Inspector.

7685. (Sec. 4.) *Use of chemicals, unwholesome yeast, etc., prohibited.* No person, persons or corporation, engaged in the brewing or manufacture of beer or other malt liquors, shall use any substance, material or chemical in the manufacture or brewing of beer or other malt liquors, other than pure hops or pure extract of hops, or of pure barley, malt, or wholesome yeast, or rice.

7686. (Sec. 5.) *Imported malt liquors to be inspected and affidavit made as to purity; labels and fees.* Every person, persons or corporation who shall receive for sale or offer for sale any beer or other malt liquors other than those manufactured in this State shall, upon receipt of same, and before offering for sale, notify the inspector, who shall be furnished with a sworn affidavit, subscribed by an officer authorized to administer oaths, from the manufacturer thereof, or other reputable person having actual knowledge of the composition of said beer or other malt liquors, that no material other than pure hops of the extract of hops, or pure barley, malt or wholesome yeast, or rice, was used in the manufacture of same; upon the receipt of said affidavit, the inspector shall inspect and label the packages containing said beer or malt

liquors, for which services he shall receive like fees as those imposed upon the manufacturers of beer and malt liquors in this State.

7687. (Sec. 6.) *Records and report of inspector.* The inspector appointed under this article shall provide himself with an office and shall record on books kept for that purpose the names and places of business of all persons engaged in the manufacture, brewing and sale of beer and malt liquors. He shall keep a record of all beer and malt liquors manufactured, brewed or sold, and the amount produced by each brewery or manufacturer, or sold by dealer. He shall keep a record of all fees collected and all expenditures incurred, and shall make a full and complete report of the same to the Governor upon the first day of each year.

7688. (Sec. 7.) *All malt products to be inspected and labeled.* It shall be the duty of each inspector to cause to be inspected all beer or other malt liquors brewed or manufactured or sold in this State, and if he shall find that such beer or other malt liquor has been made from pure hops or the pure extract of hops, or of pure barley, malt or wholesome yeast, or rice, to place upon the package containing such beer or malt liquor his label, certifying that the same has been inspected and made from wholesome ingredients.

7689. (Sec. 7a.) *State Treasurer to furnish labels, etc.* It shall be the duty of the State Treasurer, upon the taking effect of this article, to provide suitable and inimitable State certificates and labels for this inspection, gauging and labeling, having on each proper places for countersigning by the State Treasurer and inspector, and shall safely keep the same, together with the plates used in making them, when not in actual use. The State Treasurer shall, from time to time, upon demand, deliver the aforesaid labels to the inspector, taking therefor his receipt, and shall charge said inspector with the same; and shall, from time to time, as said inspector makes returns of moneys collected in the course of his inspection, credit said inspector's account with such sums, and shall keep a true and correct book account of the dealings with said inspector.

7690. (Sec. 7b.) *Fraudulent use of inspector's labels; penalty.* It shall be unlawful for any person to attempt to make or make, to attempt to sell or sell, or attempt to use or use any of the certificates or labels, or both, provided for by this article, or imitations thereof, except such persons as by law are allowed to make, sell and use the same, and any person so offending shall be deemed

guilty of a felony and, upon conviction, be punished by imprisonment in the penitentiary for a term not to exceed five years.

7691. (Sec. 8.) *Inspector's fees; "package" defined.* The inspector shall be entitled to receive for inspecting and gauging one cent for each gallon contained in each package, and two cents for labeling each package. All fees received by the inspector shall be paid into the State treasury. The word package, as used in this article, shall be construed to mean any vessel of any kind other than pint and quart bottles, in which any beer or malt liquor may be placed for sale, containing eight gallons or less; when said beer or malt liquors are placed in pint or quart bottles, a package, as used in this article, shall be construed to mean not to exceed forty-eight pint bottles or 24 quart bottles of beer or malt liquors, which, when manufactured and so bottled, must, before sale, be placed in suitable cases containing said number and size of bottles, for inspection and stamping by said State inspector; and when said beer or malt liquors shall be placed in vessels containing more than eight gallons, the word package shall be construed to mean each eight gallons or fractional part thereof so contained in said vessel.

7692. (Sec. 9.) *Expenses, salaries, etc.; disposal of fines.* The expense of said office, including the salaries of the inspector and his deputies, shall be paid monthly out of the amount appropriated by law from the general revenue fund on warrants drawn by the State Auditor on vouchers approved by the inspector, and all fees received by the inspector under the provision of this article shall, on or before the last day of each month, be paid into the State treasury by said inspector, and shall be placed to the credit of the general revenue fund.

7693. (Sec. 10.) *Sale of uninspected malt products; penalty.* Any person who shall sell any beer or malt liquors within this State which has not been inspected according to the provisions of this article, or contained in packages which shall not have upon them the certificate of the State inspector, or any person shall fail to destroy said certificate or label after the contents of said package are disposed of, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding five hundred dollars, or by imprisonment in the county jail for a period of not less than six months, and in addition thereto, shall have his license or other authority, giving him the right to manufacture or sell said liquors in this State, revoked, and shall not again receive any such license or other authority for a period of two years thereafter.

7694. (Sec. 11.) *Punishment of delinquent inspector.* If any inspector shall fail to perform any of the duties imposed upon him by this article, or shall in any manner violate any of the provisions thereof, he shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be punished by imprisonment in the county jail for not less than thirty days and by a fine not exceeding one thousand dollars, and if any said inspector shall fail to faithfully perform the duties enjoined upon him by this article, he may be removed from office by the governor.

7695. (Sec. 12.) *Prosecutions.* All prosecutions for fines and penalties under the provisions of this article shall be either by indictment or information in any court of competent jurisdiction; and when collected shall be paid one-fourth to the informer and three-fourths into the fund for the construction of public roads and highways in the county in which said offense may have been committed and prosecution begun.

7696. (Sec. 13.) *Inspection of exported malt products.* All beer or other malt liquors manufactured in the State and exported outside of the State for sale shall be inspected as other liquors designated in this article, but said inspection shall be free of cost to manufacturer.

7697. (Sec. 13a.) *Duplicate bill of lading to be furnished by transportation companies; penalty.* Every railroad, express or transportation company shall, when requested, furnish to the inspector a duplicate bill of lading or receipt showing the name of the consignor and consignee, date, place received, destination and quantity of beer or malt liquors received by them for shipment to any point within this State. Upon failure to comply with the provisions herein, said railroad, express or transportation company shall forfeit and pay to the State of Missouri the sum of fifty dollars for each and every failure, to be recovered in any court of competent jurisdiction. The inspector herein provided for is hereby authorized and empowered to sue in his own name at the relation and to the use of the State. The penalties collected shall be paid into the State treasury.

(Sec. 14.) *Appropriation.* There is hereby appropriated out of the State treasury, chargeable to the general revenue fund, for the years 1899 and 1900, for the pay of the inspector, six thousand dollars; for the pay of four deputies, twelve thousand dollars; for rent, stationery, fuel, printing, and such other things as may be necessary for the transaction of the business of said inspector, the sum of six thousand dollars.

Approved May 4, 1899. Laws of 1899, pp. 228-231; Revised Statutes, 1899, Vol. 2, pp. 1792-1795.

FLOUR, GRAIN, ETC.

8501. *Mixed grains to be branded.* No person shall sell or offer for sale any flour, meal, grits or hominy made from the admixture or adulteration of grains, unless there shall have been first branded upon each of the barrels or packages containing the same kind of grains composing said admixture, the quality and weight thereof, and the name and place of business of the person manufacturing the same: *Provided, always,* That the admixture of the several grades or kinds of wheat shall not be construed to be mixed or adulterated grains.

8502. *Defacing of brands.* No person shall deface, remove, obliterate or destroy, or cause the same to be done, any brand or mark placed upon any package or barrel of flour, meal, grits or hominy by the manufacturer thereof, with the intent to replace the brand so erased and removed by another and different brand from that of the manufacturer; and it shall not be lawful for any person to rebrand any such package or barrel so long as the contents thereof remain the same.

8503. *Brands to be filed and acknowledged.* No person shall manufacture any flour, grits, hominy or meal until he shall have filed with the recorder of deeds of the county in which his business is conducted, and acknowledged the same as deeds to lands are required to be acknowledged, a fac simile of each of the brands he intends to use, which shall contain the colors to be used in applying the same, the weight and quality of the flour, grits, hominy or meal, and the name of the manufacturer thereof, or of some person in his employ, and the state or town or place and the mill where manufactured. Should any manufacturer claim any of his said brands, or any part of the same, as a trade mark, the said recorder shall record his claim, and thereafter it shall not be lawful for any other person to use such brand: *Provided, always,* That this section shall not be construed to interfere with the right to any brand or trade mark copyrighted or patented in pursuance of an act of Congress.

8504. *False brands.* No person within this State shall use the name of a mill or a brand upon any barrel or package containing flour made from grains or the admixture of grains unless the same shall belong, bona fide, to the person using the same,

nor unless the flour upon which the same may be used was manufactured by the owner of such mill or brand.

8505. *Record of brands.* It shall be the duty of each recorder of deeds within the State to keep a book in his office, in which to record the flour brands provided for in section 8503, and a certified copy of any such record by the recorder shall be evidence in all courts of the making and filing and contents thereof.

8506. *Penalty.* Any person doing any of the acts in this article prohibited, or omitting to do any of the acts herein commanded, shall be guilty of a misdemeanor, and for each and every offense shall be punished by a fine of not less than twenty nor more than two hundred dollars, one-half of which shall be paid to the person who shall be named as prosecuting witness.

Revised Statutes, 1899, Vol. 2, p. 1992.

10578. *Label showing weight; penalty.* A barrel of flour shall consist of 196 pounds net; a sack of flour shall consist of 98 pounds net; a half sack of flour shall consist of 48 pounds net; a quarter sack of flour shall consist of 24 pounds net; no manufacturer or dealer in flour shall sell flour in barrels, sacks, half sacks or quarter sacks containing a less amount of flour than the amounts above specified. Before any barrel, sack, half sack or quarter sack of flour shall be sold, the number of pounds therein contained shall be plainly labeled or stamped thereon. Any person who shall sell any package of flour which shall be stamped or labeled with a greater number of pounds net than such package actually contains, or who shall put up or sell flour in any manner contrary to the provisions of this section, shall be deemed guilty of a misdemeanor, and upon conviction thereof, shall be fined in a sum not less than ten dollars nor more than one hundred dollars.

Revised Statutes, 1899, Vol. 2, Ch. 173, Sec. 10578, p. 2448.

#### BREAD.

10089. *Sanitation.* All rooms or buildings occupied as bus-cuit,\* bread or cake bakeries shall be drained and plumbed in a manner to conduce to the proper and healthful sanitary condition thereof, and constructed with air-shafts, windows or ventilating pipes, sufficient to insure ventilation. The furniture and utensils in such rooms shall be so arranged that the furniture and floor may at all times be kept in a proper and healthful sanitary con-

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\*So in Statutes.



dition, and no water-closet, earth-closet, privy or ash pit shall be within or communicate directly with the bake room.

10090. *Storage.* The manufactured flour or meal products shall be kept in perfectly clean, dry and properly ventilated rooms, so arranged that the floor, shelves and all facilities for storing same can be easily and perfectly cleaned.

10091. *Sleeping apartments to be separate.* The sleeping apartments for the persons employed in bakeries or confectionery establishments shall be separate and distinct from the room or rooms used for manufacture or storage of flour or meal products or for the storage of flour, meal or other articles used in the manufacture or preparation of such product.

10092. *Diseased persons not to work in bakeries.* No employer shall knowingly require, permit or suffer any person to work in his bakeshop who is affected with consumption of the lungs, or with scrofula or any communicable disease; and every person is hereby required to keep himself in a cleanly condition while engaged in the manufacture or handling of such products.

10093. *Penalty.* Any person who violates any of the provisions of this article, or refuses to comply with the requirements thereof, shall be deemed guilty of a misdemeanor, and, on conviction, shall be punished by a fine of not less than ten nor more than one hundred dollars.

10094. *Duty of Labor Commissioner.* It shall be the duty of Labor Commissioner or his deputy to see that the provisions of this article are carried into effect, and it is hereby made the duty of the prosecuting attorneys of each county or city in this State to lend all possible aid in all prosecutions for violations of any of the provisions of this article.

10095. *Article to be posted.* A copy of this article shall be kept conspicuously posted in every bake-shop or confectionery establishment in this State.

Revised Statutes, 1899, Vol. 2, Ch. 161, Art. 4, pp. 2348-2349.

#### CANDY.

2279. *Injurious ingredients.* No person shall, by himself, his servant or agent, or as the servant or agent of any other person or corporation, manufacture for sale, or knowingly sell or offer to sell, any candy adulterated by the admixture of terra alba, barytes, talc or any other mineral substance, by poisonous colors or flavors, or other ingredients deleterious or detrimental to health.

2280. *Penalty.* Whoever violates any of the provisions of section 2279 shall be punished by a fine not exceeding one hundred dollars (\$100.00), nor less than fifty dollars (\$50.00). The candy so adulterated shall be forfeited and destroyed under direction of the court.

2281. *State prosecuting attorneys.* It is hereby made the duty of the prosecuting attorneys of this State to appear for the people and to attend to the prosecution of all complaints under section 2279 in all the courts in their respective counties.

Revised Statutes, 1899. Vol. 1, p. 630.

#### VINEGAR.

2282. (1) *Imitation or adulterated cider vinegar; penalty.* That any person who manufactures for sale, or offers or exposes for sale as cider vinegar, any vinegar not the legitimate product of pure juice, known as apple cider, or vinegar not made exclusively of said apple cider or vinegar into which foreign substances, drugs or acids have been introduced, as may appear on proper tests, shall be deemed guilty of a misdemeanor, and, upon conviction thereof, be punished for every offense by fine of not less than fifty dollars nor more than one hundred dollars and the costs of prosecution, or by imprisonment in the county jail not to exceed ninety days.

2283. (2) *Artificial coloring or flavoring; false branding.* All vinegar sold or offered for sale, exchange or delivery shall be without artificial coloring or flavoring; and no person, by himself or by his agent or employe, shall sell or offer for sale, exchange, deliver, or knowingly have in his custody or possession, with intent to sell or exchange or expose or offer for sale or exchange, any vinegar labeled or branded as cider vinegar, or as apple vinegar, which is not the legitimate product of pure apple juice or that is not made exclusively from apple cider.

2284. (3) *Branding; inspection.* Every person making or manufacturing apple cider, or other fruit vinegar, for sale, shall brand on both heads of each cask, barrel or keg, containing such vinegar, the name and location of the manufacturer or firm, and also the name of the fruit out of which the vinegar is made; and where there are inspectors of food products, vinegar shall be one of the articles under supervision of such inspector, with power to inspect and seize any that may be found fraudulent and in violation of sections 2282, 2283, 2284 and 2285.

2285. (4) *Branding of "fruit vinegar;" penalty.* No vinegar shall be branded "fruit vinegar" unless the same shall be made wholly from apples, grapes or other fruits; and any person who shall knowingly brand, label or sell, or offer for sale as such "fruit vinegar," any vinegar not made wholly from apples, grapes or other fruit, or who shall violate any one of the foregoing sections, shall be deemed guilty of a misdemeanor, and be punished as provided in section 2282.

Approved April 1, 1891. Revised Statutes, 1899, Vol. 1, pp. 630-631.

#### DAIRY PRODUCTS.

2276. *Imitation butter and cheese to be so labeled; penalty.* Whoever manufactures out of any oleaginous substances, or any compounds of the same, resembling butter in appearance, manufactured from cattle fat or hog fat, or such substances heretofore known as oleomargarine, oleo, oleomargarine oil, butterine, lardine, suine and neutral, all lard extracts and tallow extracts, and all mixtures and compounds of tallow, beef fat, suet, lard, lard oil, vegetable oil, annatto and other coloring matter, intestinal fat and offal fat, other than that produced from unadulterated milk or cream from the same, any article designed to take the place of butter or cheese, produced from pure unadulterated milk or cream of the same, or any article made in imitation of butter, or when so made calculated, or intended to be sold as butter or for butter, unless said manufacturers shall pack said imitation substitute in firkins, tubs or wooden or paper packages, with the true name of said imitation substitute clearly and indelibly branded, marked or labeled thereon, or whoever shall sell, or offer for sale, the same as an article of food, unless said imitation substitute is properly packed in firkins, tubs or wooden or paper packages, with the true name of said imitation substitute clearly and indelibly branded, marked or labeled thereon, shall be guilty of a misdemeanor, and shall, on conviction thereof, be confined in the county jail not exceeding one year, or fined not exceeding one thousand dollars, or both.

2277. *Use of imitation butter in hotels, etc.; penalty.* Any hotel or boardinghouse-keeper in this State who shall set before his guests at any meal any compound resembling butter in appearance, manufactured from cattle fat or hog fat, or such other articles, known to the trade as oleomargarine, and shall not clearly and legibly mark the vessel in which such compound is served,

with the words "oleomargarine," or "impure butter," shall be deemed guilty of a misdemeanor, and upon conviction, shall be fined in a sum of not less than one hundred nor more than five hundred dollars.

Revised Statutes, 1899, Vol. 1, p. 629.

4744. *Imitation butter defined.* For the purpose of this article, every article, substitute or compound, other than that produced from pure milk, or cream from the same, made in the semblance of butter and designed to be used as a substitute for butter made from pure milk, or cream from the same, is hereby declared to be imitation butter.

4745. *Animal fat, vegetable oil and coloring matter in butter substitutes.* No person shall combine any animal fat or vegetable oil or other substance with butter, or combine therewith or with animal fat or vegetable oil or combination of the two, or with either one, any other substance or substances whatever, any annatto or compound of the same, or any other substance or substances, for the purpose or with the effect of imparting thereto a yellow color, or any shade of yellow, so that such substitute shall resemble yellow or any shade of genuine yellow butter, nor introduce any such coloring matter or such substance or substances into any of the articles of which the same is composed: *Provided*, nothing in this article shall be construed to prohibit the use of salt and harmless coloring matter for coloring the substitutes for butter manufactured for export or sale outside the State. No person shall, by himself, his agents or employes, produce or manufacture any substance in imitation or semblance of natural butter, nor sell, nor keep for sale, nor offer for sale, any imitation butter made or manufactured, compounded or produced in violation of this section, whether such imitation butter shall be made or produced in this State or elsewhere. This section shall not be construed to prohibit the manufacture and sale, under the regulations hereinafter provided, of substances designed to be used as a substitute for butter, and not manufactured or colored as herein prohibited.

4746. *Brand for butter substitutes.* Every person who lawfully manufactures any substance designed to be used as a substitute for butter shall mark, by branding, stamping or stenciling upon the top and side of each tub, firkin, box or other package in which such article shall be kept, and in which it shall be removed from the place where it is produced in a clean and durable manner, in the English language, the words "Substitute for butter,"

in printed letters, in plain Roman type, each of which shall not be less than one inch in length and one-half inch in width.

4747. *Transportation of unbranded butter substitutes prohibited.* No person, by himself or another, shall ship, consign or forward by any common carrier, whether public or private, any substance designed to be used as a substitute for butter, and no carrier shall knowingly receive the same for the purpose of forwarding or transporting unless it shall be manufactured and marked as provided in the preceding section of this article, and unless it be consigned by the carrier and receipted for by its true name: *Provided*, That this article shall not apply to any goods in transit between foreign states across the State of Missouri.

4748. *Possession of unmarked butter substitutes.* No person shall have in his possession or under his control any substance designed to be used as a substitute for butter, unless the tub, firkin, box or other package containing the same be clearly and durably marked, as provided by section 4747 of this article: *Provided*, That this section shall not be deemed to apply to persons who have the same in their possession for the actual consumption of themselves and family. Every person having in possession or control of any substance designed to be used as a substitute for butter, which is not marked, as required by the provisions of this article, shall be presumed to have known during the time of such possession or control the true character and name, as fixed by this article of such product.

4749. *Substitute butter sold as genuine.* No person, by himself or another, shall sell or offer for sale any substance designed to be used as a substitute for butter under the name of or under the pretense that the same is butter.

4750. *Penalties.* Every person, firm or corporation who shall violate any of the provisions of section 4745, 4746, 4747, 4748 and 4749 of this article shall forfeit and pay to the State of Missouri, for the use of the school fund for every such violation, the sum of fifty dollars and costs of suit, to be recovered by civil action in the name of the State of Missouri on the relation of any person having knowledge of the facts before any justice of the peace of the city or county where such violation occurs, or any other court of competent jurisdiction, subject to appeal to the circuit court, as in other cases; and it is further enacted that every person, firm or corporation who shall violate the provisions of this article, in addition to the civil liability of the State of Missouri herein provided, shall be deemed guilty of a misdemeanor, and

shall, for the first offense, be punished by a fine of not less than fifty dollars (\$50.00) nor more than one hundred dollars (\$100.00) or by imprisonment not exceeding thirty days, and for each subsequent offense, by a fine of not less than two hundred and fifty dollars (\$250.00) nor more than five hundred dollars (\$500.00), or by imprisonment in the county jail not less than thirty days nor more than six months, or by both such fine and imprisonment, in the discretion of the court.—*As amended March 19, 1901; Laws of 1901, p. 44.*

4751. *Certificate of analysis.* A certificate of an analysis of any dairy product or adulteration or imitation thereof, when duly signed by a professor of chemistry connected with any of the departments of the State University or Experiment Station, shall, when acknowledged by any person authorized to administer an oath, be received in the courts of this State as prima facie evidence of the facts stated therein, in all civil actions, as provided for in section 4750 of this act.—*As amended March 19, 1901; Laws of 1901, p. 44.*

4752. *Party to violation can not bring suit.* No action can be maintained on account of any sale or other contract made in violation of or with intent to violate this article, by or through any person who was knowingly a party to such wrongful sale or other cancel or remove any mark provided for by this article, with intent contract.

4753. *Removal of marks, etc.* Whoever shall efface, erase, to mislead, deceive, or to violate any of the provisions of this article, shall be deemed guilty of a misdemeanor.

4754. *Enforcement of law.* The State Board of Agriculture shall be and is hereby charged with the enforcement of this article: *Provided*, That all fines collected under the provisions of this article shall be paid into the State treasury. Actions under this article shall be brought in any court of competent jurisdiction.

4755. *"Skimmed milk" or "not full-cream" cheese must be so labeled.* No person or persons, corporation, company or other association or congregation of individuals shall manufacture, sell or offer for sale, directly or indirectly, at retail or at wholesale, in this State any article to be known or denominated cheese, not made from pure cream or unskimmed milk or cream of the milk, unless such person or persons, corporation, company or association of individuals manufacturing the same, or offering the same for sale, or selling the same, shall brand or label such cheese or article so offered for sale, denominated a cheese, with black letters not less

than one inch in length in a conspicuous place and of large size, in the English language, as follows: "Skimmed milk cheese," or with the words "not full cream cheese," giving the true name of such article called cheese so manufactured or offered for sale, clearly and indelibly branded, marked or labeled thereon, so that the same can be distinctly read and fully comprehended at all stores or places or factories where the same may be offered for sale.

4756. *"Skimmed milk cheese" and "full-cream cheese" defined.* All cheese manufactured, sold or offered for sale in this State at retail or wholesale, made from milk or cream of same, which tests not less than three per cent. of butter fat, shall be deemed to be full cream cheese, and all cheese manufactured, sold or offered for sale at any place or in any manner by any person or persons in this State at retail or wholesale made from milk or cream of same testing less than three per cent. of butter fat, shall be deemed "skimmed milk cheese," or cheese not made from pure unskimmed, unadulterated milk or cream of same.

4757. *Penalty.* Any person or persons who shall violate any of the provisions of section 4755 or 4756 of this article shall be deemed guilty of a misdemeanor, and shall, on conviction thereof in any court of competent jurisdiction, be confined in the county jail not exceeding one year, or fined not less than \$10 nor exceeding \$500, or both.

4758. *Transportation of "skimmed milk" and not "full-cream" cheese; penalty.* No person, by himself or another, shall ship, consign or forward by any common carrier, whether public or private, any substance designed to be used as a cheese, not made from pure, unskimmed milk or cream of the same testing at least three per cent. butter fat, unless such cheese is marked or labeled "skimmed milk cheese," or with the words "not full cream cheese" labeled thereon: *Provided*, That this article shall not apply to any goods in transit between foreign states across the State of Missouri. Any person violating this section shall be deemed guilty of a misdemeanor, and, upon conviction, shall be fined a sum not less than \$10 nor more than \$500.

4759. *Party to violation of law may not bring suit.* No action can be maintained on account of any sale or other contract made with the manufacturer or person offering any cheese for sale in violation of or with intent to violate this article by or through any person who is knowingly a party to such wrongful sale, or

other contract for the sale of unbranded skimmed milk cheese or cheese not full cream cheese.

4760. *Removal of labels, etc.; penalty.* Whoever shall efface, erase, cancel or remove any marks or label on any such article or cheese, provided for by this article, with intent to mislead, deceive or to violate any of the provisions of this article, shall be deemed guilty of a misdemeanor, and, on a conviction, be fined in a sum not less than \$50 nor more than \$500.

4671. *Enforcement of law.* The State Board of Agriculture shall be and is hereby charged with the enforcement of this article: *Provided*, That all fines collected under the provisions of this article shall be paid into the State treasury. Action under this article may be brought by information or indictment in any court of competent jurisdiction.

Revised Statutes, 1899, Vol. 2, Arts. 5 and 6, pp. 1129-1131.

6165. *Cities may, by ordinance, regulate sale of milk.* All cities and towns in the State shall have power, by ordinance, to license and regulate milk dairies and the sale of milk, and provide for the inspection thereof.

Revised Statutes, 1899, Vol. 2, p. 1442.

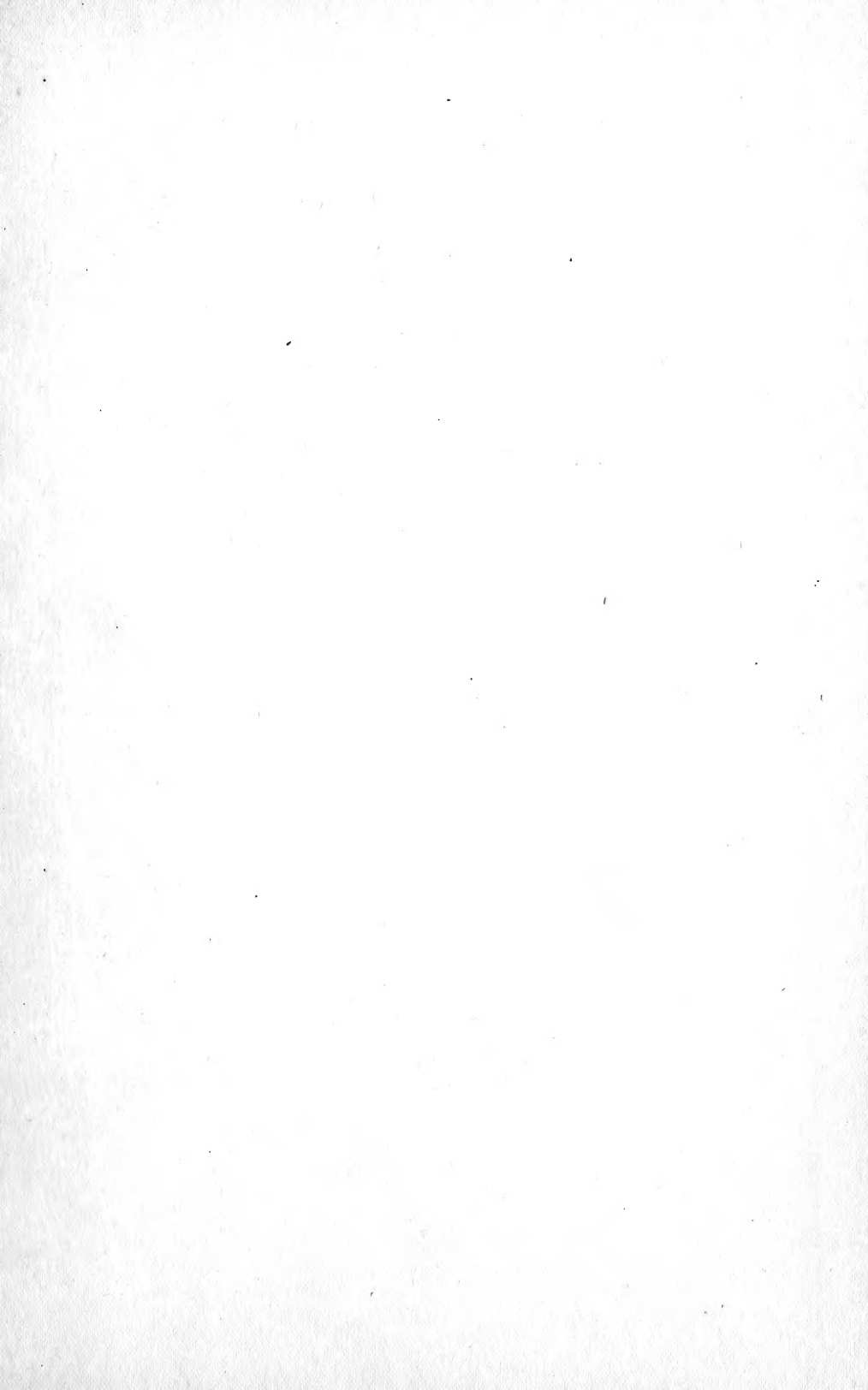












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